TODD PACIFIC SHIPYARDS CORPORATION
LOS ANGELES DIVISION

LONG-RANGE FACILITIES - PLAN

CONTRACT MA-80-SAC-01029

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LONG-RANGE FACILITIES PLAN

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SECTION I.

LONG-RANGE BUSINESS PLAN

The Todd Shipyards Corporations corporate office commissioned International Maritime Associates, Inc. of Washington, D.C., to study and prepare a report on the future business potential of the Todd Pacific Shipyards Corporation. The final report titled "Feasibility of Proposed Yard Improvements Program, Todd Pacific Shipyards Corporation" was issued July 15, 1980. This report indicates that the anticipated short-term, one to three years, improvement program at the Los Angeles Division will generate sufficient revenue to be profitable.

The I.M.A. report is included as Appendix A to this report.

SECTION II.

PRIMARY OBJECTIVES AND GOALS FOR THE YARD

As described in Section III of this report, titled "Brief History of the Yard," a large part of the yard facilities were developed during World War II. Although extensive changes have been made to selected facilities, mainly hull construction, over the intervening years, an extensive rebuilding must be undertaken during the next ten to twenty years to replace those facilities which must be retired because of age and to replace equipment which has been outdated by technological advances.

The principal objective of the long-range plan is to provide a baseline against which all projected changes to the yard facilities and additions, changes or deletions to equipment may be measured to assure the orderly and efficient progress of yard improvement.

Using the long-range plan as the guide, the long-term goals of the shipyard include, but are not limited to, the following:

Construct a land level facility including a ship lift platform, transfer. car and work bays which can ultimately replace one or both of the existing dry docks.

Reorganize the warehousing by constructing new facilities adjacent to the existing building ways and the new land

level facility and thus reduce the commercial vehicle traffic within the shipyard.

Construct or relocate the shops into central locations gathering up the fragmented operations which have developed over the years into efficient controllable groups.

Develop an efficient internal transportation system that will allow rapid movement of large loads such as hull units between assembly sites, pre-erection outfitting sites and erection sites.

Develop a new blast and paint *area* that will assure us of being able to meet clear air standards of the future.

Develop a heavy lift outfitting berth which will allow us to lift preoutfitted superstructures and weapons modules aboard completed hulls.

Negotiate an expanded lease with the Los Angeles Harbor Department to bring available adjacent property into the yard area.

Construct a new administrative facility in a location outside the production area to release the space currently occupied by this activity to production and remove the

attendant visitor traffic away from production activity.

Achieve a 50/50 split between new construction and repair/ overhaul/conversion revenues, including both Naval and commercial programs.

The bottom line of all these planned changes is to reduce the cost and schedule of the shipwork and improve the Division’s competitive position.

SECTION III.

BRIEF HISTORY OF TEE YARD

The Todd Shipyards Corporation derives its name from William H. Todd, who, in 1915 as President of the Robins Dry Dock and Repair Company, in cooperation with his associates formed the William H. Todd Corporation and took title to the Robins firm. The Robins Dry Dock and Repair Company was a direct descendant, via the Erie Basin Dry Dock Company, of the DeLamater Iron Works, builder of the "Monitor."

The William H. Todd Corporation expanded by acquiring shipyards in Hoboken, New Jersey, and Seattle, Washington. In 1916 the Todd Shipyards Corporation was formed to acquire the stock of the William H. Todd Corporation.

In December 1943, by Executive Order of the President of the United States, the Navy took control of the Los Angeles Shipbuilding and Drydock Corporation located in the west basin of the Los Angeles Harbor, at San Pedro, California. The Navy then engaged Todd Shipyards Corporation to take over management of this plant. Todd continued in this capacity until January 1946. Since November 1946 the Todd Shipyards Corporation has operated this plant as its Los Angeles Division, having acquired the right, title and interest of the Los Angeles Shipbuilding and Drydock Corporation.

On October 1, 1977, the Los Angeles and Seattle Divisions of Todd formed Todd Pacific Shipyards Corporation ("Todd Pacific") which is a wholly-owned subsidiary of Todd and since that date the plant has been known as the Los Angeles Division of Todd Pacific Shipyards Corporation.

During World War II the level of employment at the Los Angeles Division reached a peak of more than 20,000 employees. Todd completed the ships under construction by Los Angeles Shipbuilding on December 8, 1943, and built numerous others for the Government before the end of World War II. Todd's contribution to the war effort was recognized by several national awards for excellence.

With the termination of construction activities at the end of World War II, Todd Los Angeles concentrated on repair and conversion work. It also expanded its activities to include industrial fabrication and machine work projects. The volume of business reached a low ebb in 1949, but Todd returned to a limited wartime level with increased ship repair and conversion work due to the outbreak of the Korean War in 1950.

The volumem of business reverted to a much lower level after termination of the Korean War in 1953. Todd Los Angeles continued its trend toward diversification in the years which followed. An example of this diversification was construction in

1955 of a replica of the sternwheeler "Mark Twain" for Disneyland and fabrication of eight 52 foot submarines for the Disneyland "Navy." This was followed by fabrication of the masts, rigging, spars and sails for the 106 foot pirate ship "Columbia."

No major ships were built in California from the end of World War II until 1958. One of the basic reasons was that the property tax structure made it impossible for California shipyards to compete effectively on a national scale for new construction contracts. Todd took the lead, with other shipyard operators joining in, to propose remedial action to the California Legislature. This effort was successful and, in 1958, the applicable statutes were amended to eliminate all property tax on major vessels under construction in this state.

With the prospect of a revival of new ship construction, Todd embarked upon a program to restore the shipbuilding capability of the Los Angeles Division with an investment in excess of $6,000,000. The shipbuilding ways were reactivated and complete new prefabrication and subassembly areas were constructed, as well as a new plate shop. The latest in production methods and equipment were adopted, such as tenth-scale drawing, optical by controlled flame cutting, rotoblasting and flat stacking of plates with vacuum lifters.

Sizeable additional capital additions and replacements were made

in the eight year period following 1958. During that time, the plant was classified as an industrial reserve facility and the Navy Department continued to own a major portion of the structures and equipment installed before and during World War II.

In 1966, the entire industrial reserve facility at Los Angeles was declared excess to the needs of the Navy Department and Todd purchased all of the Navy Department's remaining interest in the plant facilities. Since 1967, Todd has expended in excess of $30,000,000 for improvements and additions to enhance the shipbuilding and repair capability of the Los Angeles Division.

The shipbuilding program which was reactivated in 1958 has been successful. Among the ships constructed for private ownership have been two combination passenger-cargo vessels for Moore-McCormick Lines, and three for American Mail Lines, four product carriers for Zapata Bulk Transport, Inc., and eight deck cargo barges for Crowley Maritime designed for use in the Alaskan oil trade. The Zapata ships were 35,000 dead weight tons (“DWT”) with an overall length of 711 feet, a beam of 84 feet, a carrying capacity of 224,000 barrels of cargo and a speed of 16 knots. The barges were 250 feet long by 76 feet wide and 16 feet - 8 inches deep.

Also for private ownership, the Los Angeles Division completed four giant forebodies, including high speed bulbous bows, for Sea

Land Service, Inc. These forebodies were joined after launching to upgraded and overhauled stern sections of exisitng vessels which resulted in container ships of over 600 feet in length.

Major conversions for private owners included converting the PRESIDENT GRANT, PRESIDENT McKINLEY and PRESIDENT FILLMORE to container ships for American President Lines, Ltd. These ships were designed to carry breakbulk and refrigerated cargo in seven cargo holds and to accommodate twelve passengers and a crew of forty-seven. During this period, the Division also completed construction of a liquid anhydrous ammonia carrier for Collier Carbon and Chemical Corporation. This construction involved joining a 470 foot long forebody to the stern section of the SS SISTER KATINGO.

For the account of the Government, Todd Los Angeles has built and delivered two Guided Missile Frigates (DLG), seven Destroyer Escorts (DE) and four Guided Missile Frigates of the FFG-7 class for the Navy Department and four 25,000 DWT tankers for charter by the Military Sealift Command. The DLGs were 5,500 tons, 547 feet long and had a beam of 47 feet. The FFG-7 vessels are 3,600 tons, 445 feet long with a beam of 47 feet. The vessels constructed for the Navy were highly sophisticated fighting ships of advanced design.

Major conversions for the Government has included a contract in

965 for modification, renovation and conversion of the USS ASHTABULA (AO 51) to an AO (JUMBO) Fleet Oiler. Supplementing the ship construction program Todd Los Angeles has also performed other work for Government Agencies such as fabrication of launch test missiles for the Polaris program, machining and assembling the bases of tracking antenna for other NASA programs and fabrication of thousands of feet of special piping for the Atomic Energy Commission.

The Los Angeles plant has made a strong comeback since the mid-70s mainly on the strength of the FFG program, assisted also by the barge construction contract for Crowley. The FFG program, which is currently underway, includes eleven additional ships at present.

Currently the Los Angeles Division contains *some* 90 acres on which are located both ship new construction and repair facilities. The yard is currently equipped with:

- One floating dry dock 400 ft. long with a lift capacity of 8,000 tons
- One floating dry dock 528 ft. long with a lift capacity of 16,000 tons
- TWO end launch shipbuilding ways capable of handling ships 725 ft. long with 90 ft. beam served by five cranes with capacities of 25 to 175 tons

- 5,200 linear ft. of berthing space on six piers serviced by seven whirly cranes with capabilities of 28 to 50 tons
- 219,000 square ft. of shop space
- 118,000 square ft. of warehouse space
- 160,000 square ft. of steel storage
- 313,000 square ft. of open assembly area
- The shops contain the following major equipment:

  1,000 ton press brake
  8 ft. plate bending rolls
  54 inch x 54 ft. shaft lathe
  120 inch x 35 ft. engine lathe
  300 ton hydraulic press
  Linde CM-1OO N/C flame cutting unit
  Schichau-Monopol flame cutting units (2)
  Rotoblast shot blast and paint unit for structural steel
  9 ft. x 9 ft. x 32 ft. stress relieving furnace
  8 inch hydraulic pipe bender
  Vacublast facility and related equipment
  Travograph plate burning machine
  8 inch pipe bender (can be retrofitted for numerical control)
  Whitney Punch N/C and plasma flame cutting unit

CM95 N/C multiple torch Gas and Plasma
flame cutting unit

Cincinnati-Milacron T-3 industrial robot
with weld positioner table

SECTION IV.

ASSUMPTIONS ON WHICH THE PLAN WILL BE BASED

The following is a list of the assumptions upon which this long-range plan is based:

- The national concern over the decline in United States "sea power" will be translated into action.
- The Navy fleet will be expanded to 600 or more vessels in a measured and predictable manner which will require U.S. shipyards to modernize facilities, equipment and methods to meet firm goals.
- The Merchant Marine fleet will be expanded and modernized at a measured and predictable rate.
- The Government, via the Maritime Administration and the Navy will take the lead in coordinating the R & D) programs of the future to avoid costly duplication of effort in this field.
- The current Navy shipbuilding programs with their attendant post shakedown overhauls will continue at pace until the next generation of ships can be blended into the schedules.
- The homeporting of Navy ships in Long Beach ***will*** be accomplished at the announced pace and thus bring more conversion and repair projects into the Los Angeles area.
- The shiplift and land level repair and new construction facility currently being developed will experience the same level of work load growth that historically has been experienced by these installations elsewhere.
- The Port of Los Angeles will make additional land available.

SECTION V.

LONG-RANGE FACILITIES PLAN

The long-range plan presented in this report is not just a result of the Maritime Administration contract of April 1980.

Todd's Los Angeles Division started developing long-range plans prior to their reentry into the new construction business in 1958. These plans were of short or intermediate range by the current definitions. Plate 9.1 shows the shipyard in the post World War II configuration. Note how the material storage, assembly areas and shipways are isolated from one another.

Plate 9.2 shows the shipyard configuration as it was constructed based on the modernization plans of the mid-1950s. Note how the steel process now has an unobstructed flow to the shipways.

Plate 9.3 shows the shipyard configuration for the mid-1970s. This intermediate range plan was a direct outgrowth of an intense review of the 1950s plan which was molded into a revised plan in 1969 and 1970 and became the mid-70s plan. The principal features of this plan were:

- elimination of one shipway
  increased crane capacity at the ways and major assembly areas
- a new blast and paint facility

- a new flame planer
- a new semiautomatic panel assembly line

Plate 9.4 shows the current configuration of the shipyard. Note that many features of the Plate 9.4 plan were accomplished.

The experience gained from developing and following through with the construction based on these previous plans has led to many of the features of the current long-range plan as shown on Plate 5.1. This plan is unique compared to the previous plans because it addresses for the first time a definite commitment to making a substantial improvement in this shipyard's repair/overhaul/ conversion capabilities.

Previous long-range plans were developed around the then current assessments of vessels expected to be in demand. None of these assessments proved to be accurate and therefore these plans were not translated into actual facilities.

The long-range plan therefore has been developed to address basic problems of the shipbuilding and repair business and no attempt has been made to quantify tons of steel, feet of pipe, etc.

The basic features of this plan are:

- The emplacement of those activities which generate heavy outside traffic, i.e., warehousing, administration, etc.

on the shipyards perimeter where there is direct access, thus keeping this traffic out of the production areas.

Establishing a wide clear, roadway to permit transport of heavy equipment, ordance modules, hull or deckhouse units, etc. to the principal areas of the yard.

Establishing a heavy lift outfitting berth with 240 short tons lifting capacity minimum.

The complete reconstruction of the repair/overhaul/ conversion area by removing the existing piers E and F (see Plates 9.4 and 5.1) extending Pier D to the existing western shoreline and installing a land level ship berthing system. The principal components of this system are:

- a shiplift 106 by 655 feet designed to lift on a cradle 33 tons per foot (22,000 LT uniformly loaded pick up weight)
- a side transfer car capable of transferring a 600 foot L.O.A. vessel on its cradle laterally
- a large work bay 148 by 840 feet (#I) capable of holding a single large vessel or up to four FFG type vessels
- one work bay 120 by 740 feet (#2) designed to accommodate one ship
- three work bays 120 by 600 feet (#3 - #5) designed to accommodate one ship each
- space reserved for two additional work bays each 120 by 600 feet (#6 & #7)

LAND REQUIREMENTS

Todd has recently negotiated a "term permit" for additional land in the southwestern area (see Plate 5.1) designated for parking. In addition a revocable permit has been negotiated for land in the northwestern area designated "buffer storage and future parking. " A portion of this area will be utilized for a Port of Los Angeles development project and a term permit for the remaining area will be negotiated when the Port of Los Angeles project is firmly defined.

At an undetermined time in the future, in accordance with the Port of Los Angeles Master Plan, Front Street/Harbor Boulevard will be realigned; making available some additional twelve acres of land. Todd Shipyards is on record with the Port of Los Angeles *as* wanting to acquire the property whenever it becomes available. The expansion of the shipyard into this area is shown by broken lines on the "Long-Range Plan."

MATERIAL, HANDLING

The Long-Range Plan development has identified several areas where material handling improvements can make a substantial contribution to the overall efficiency of the shipyard.

The most important are:

STRUCTURAL MATERIAL

Steel plate and shape storage will remain in the same general location in the southwest section of the shipyard where the railroad and truck access will be modified to allow both to enter on the same roadway which can be fenced in such a way that it is isolated from the shipyard. A wide span gantry crane will be placed to permit its operator to unload trucks or rail cars with a magnetic fixture and move the material to storage onto a fee conveyor system. This conveyor system will run the entire length of the southwest wall of the steel shop to permit the crane to transfer material from transport or storage to the conveyor rolls. A blast and primer facility will be incorporated into the conveyor system. This conveyor system will then feed the material onto a roller cart which can traverse the northwest end of the shop to deliver material to the feed rolls of the primary cutting machines. The material will then progress southeastward through the cutting, forming and subassembly areas of the shop, emerging from the northeast corner of the building onto the panel line or main assembly platens.

PIPE

The Long-Range Plan direct the relocation of the pipe shop from the current location at the foot of Pier A into the building now occupied by warehouse activities (building 103, Plate 9.4). This location provides space for adjacent pipe storage with direct access into the shop building. This building also has adequate space for storing ready material, i.e., flanges, fittings, etc. The new hull unit outfitting areas are also within easy reach of this location.

GENERAL

- A transporter of sufficient capacity to move hull and deckhouse units from assembly areas to outfitting, blast, paint and ship repair areas will be acquired.
- An additional large whirley crane of 175 ton capacity is included in this plan. This crane will be installed on a new craneway starting on a new pier west of the shipbuilding ways and extending inland to the steel shop. This crane will be supplemented by installing a transfer system which will allow the existing 175 ton crane to be moved onto this new *craneway* where both cranes can combine to make heavy lifts outboard of the new pier and lift and transfer a preoutfitted deckhouse from the adjacent platen direct to a ship at the pier.
- The warehouse activities will be decentralized to move material storage activities closer to the areas of primary consumption, i.e., shipbuilding ways and the new land level new construction and repair facility.

COMMUNICATIONS

The shipyard is now installing a Bell Telephone Dimension 2000 PBX system. This system is designed to serve the need of the shipyard until the administration activities are moved to the new building.

COMPUTER-AIDED DESIGN/COMPUTER-AIDED MANUFACTURING (CAD/CAM)

The shipyard is currently installing a CAD\CAM system using a Prime, Model P-750 computer. This system will be wired directly into the primary plate cutting machines, CM-95 and CM-1OO as well as the pipe bending equipment.

The shipyard has utilized the CAD\CAM Prime Computer to bring on line the "Vision" management system of Systonetics Inc. This system has cost/schedule integration capabilities. The system will be expanded by adding a second Prime, model P-750 computer. In the future all the major shops and administrative departments will have terminals.

A word processing system using the same terminals has also been developed and will expand with the "Vision" system.

UTILITIES

A major upgrading of the shipyard utilities will begin with the development and construction of the ship lift and land level work

bays. This upgrading will keep pace with the land level work bays development and include electric power, potable water, fire water, sewer service, compressed air, argon, oxygen, natural gas and steam.

BUILDINGS

This Long-Range Plan calls for the replacement of all but one of the major existing buildings. The existing buildings were constructed in two major phases, 1917-1918 and 1942-1943. Most of these buildings will be retired over the next twenty years or require extensive reconstruction. This long-range plan provides a baseline against which the funds required for reconstruction can be balanced against a definite structure life expectancy.

MAJOR EQUIPMENT

Keeping pace with the relocation of activities will be the addition of new equipment including but not limited to:

A large transporter of about 300 short tons capacity.
A new multi cutting table plate cutting machine similar to the existing CM-1OO.
A large plate roll of about 40 feet by one inch capacity.
Four new 14 ton tower cranes for the land level facility.
Two additional 35 ton traveling whirley cranes for the ship lift and floating dry dock.
- An additional 175 ton whirley crane in the shipway area.
Ship lift and transfer system.

Although the types of equipment anticipated for this long-range plan have been identified, the rapid advance in the state of the art in computer controlled equipment makes it impractical to identify specific manufacturers.

SHIPYARD MODEL

A scale model of the shipyard has been constructed. This model has a base of heavy plywood covered with light sheet steel and hanger hardware so it can be mounted on a wall. The scale models of structures and major equipment such as cranes with trackways, the ship lift, etc., are cut from pine blocks and have magnets attached. This arrangement will allow the model to be readily arranged in different configurations to display candidate arrangements and progress. A photographic record will be maintained.

Plate 5.4 is a photo of the model in the “as is” configuration.

Plate 5.5 is a photo of the model in the configuration at the completion of the long-range plan.

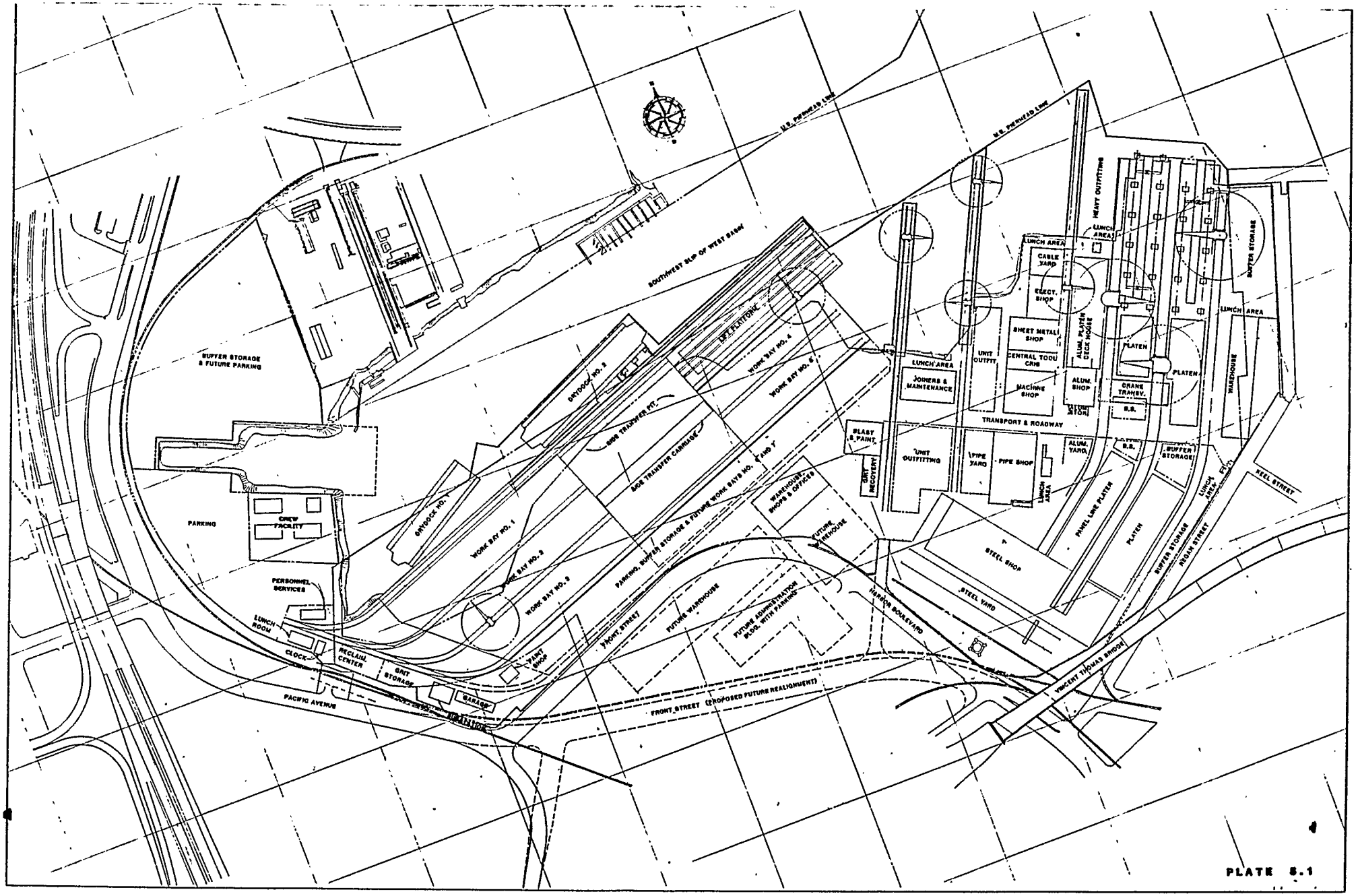

U.S. PIERHEAD LINE
SOUTHWEST SLIP OF WEST BASIN
BUFFER STORAGE & FUTURE PARKING
DRYDOCK NO. 3
DRYDOCK NO. 4
WORK BAY NO. 4
WORK BAY NO. 5
BAR TRANSFER PIT
BAR TRANSFER CARRIAGE
PARKING
CREW FACILITY
DRYDOCK NO. 1
WORK BAY NO. 1
WORK BAY NO. 2
WORK BAY NO. 3
PERSONNEL SERVICES
LUNCH ROOM
CLOCK
RECLAIM. CENTER
GRIT STORAGE
PAINT SHOP
GARAGE
PACIFIC AVENUE
PARKING, BUFFER STORAGE & FUTURE WORK BAYS NO. 6 AND 7
WAREHOUSE, SHOPS & OFFICES
FUTURE WAREHOUSE
FRONT STREET
FUTURE WAREHOUSE
FUTURE ADMINISTRATION BLDG. WITH PARKING
FRONT STREET (PROPOSED FUTURE REALIGNMENT)
HARBOR BOULEVARD
HEAVY OUTFITTING
LUNCH AREA
CABLE YARD
ELECT. SHOP
SHEET METAL SHOP
CENTRAL TOOL CRIB
ALUM. PLATEN DECK HOUSE
PLATEN
BUFFER STORAGE
LUNCH AREA
WAREHOUSE
LUNCH AREA
JOINERS & MAINTENANCE
MACHINE SHOP
ALUM. SHOP
CRANE TRANSV.
UNIT OUTFIT.
UNIT OUTFITTING
TRANSPORT & ROADWAY
BLAST & PAINT
GRIT RECOVERY
PIPE YARD
PIPE SHOP
ALUM. YARD
LUNCH AREA
BUFFER STORAGE
KEEL STREET
STEEL SHOP
PANEL LINE PLATEN
PLATEN
BUFFER STORAGE
LUNCH AREA
PROPAM STREET
STEEL YARD
VINCENT THOMAS BRIDGE

PLATE 5.1

LONG-RANGE PLAN LEASE AREA

	Water	Land
Basic Lease (2-1947)	1,048,216 sq.ft.	2,858,227 sq.ft.
Regan Forge area (5-4415)		130,889
Hatch parking (5-4354)		69,529
Front St.-Pacific Ave. (5-4355)		93,141
Railroad, Todd spur		1,321
Pier D, E, F & Dry Dock No. 2	92,524	72,750
Sun Lumber, SW Sect. (inc. 78,763 *crew* facility)	-	329,759
Realigned Front St.-Harbor Blvd.	-	564,475
TOTAL	1,140,740 sq.ft.	4,120,091 sq.ft.

Plate 5.2

LONG-RANGE PLAN AREA UTILIZATION

Summary

Activity	* Land Area	% of Total
Buildings	674,625	16.4
Semiautomatic material. handling	23,250	.6
Material preparation and subassembly (outside)		
Hull unit assembly (outside)	228,825	5.5
Dedicated storage (outside)	258,042	6.3
Hull unit outfitting	129,700	3.1
General storage	246,245	6.0
Lunch areas	44,325	1.1
Utility stations	14,000	.3
Shipways	144,000	3.5
Parking	345,000	8.4
Ship's crew facilities	164,800	4.0
Work bays	475,600	11.5
Side transfer	290,520	7.0
Lift platform	91,790	2.2
Craneways - roadways - railways	989,369	23.0
TOTAL YARD AREA	4,120,091	

*All areas are quantified in square feet.

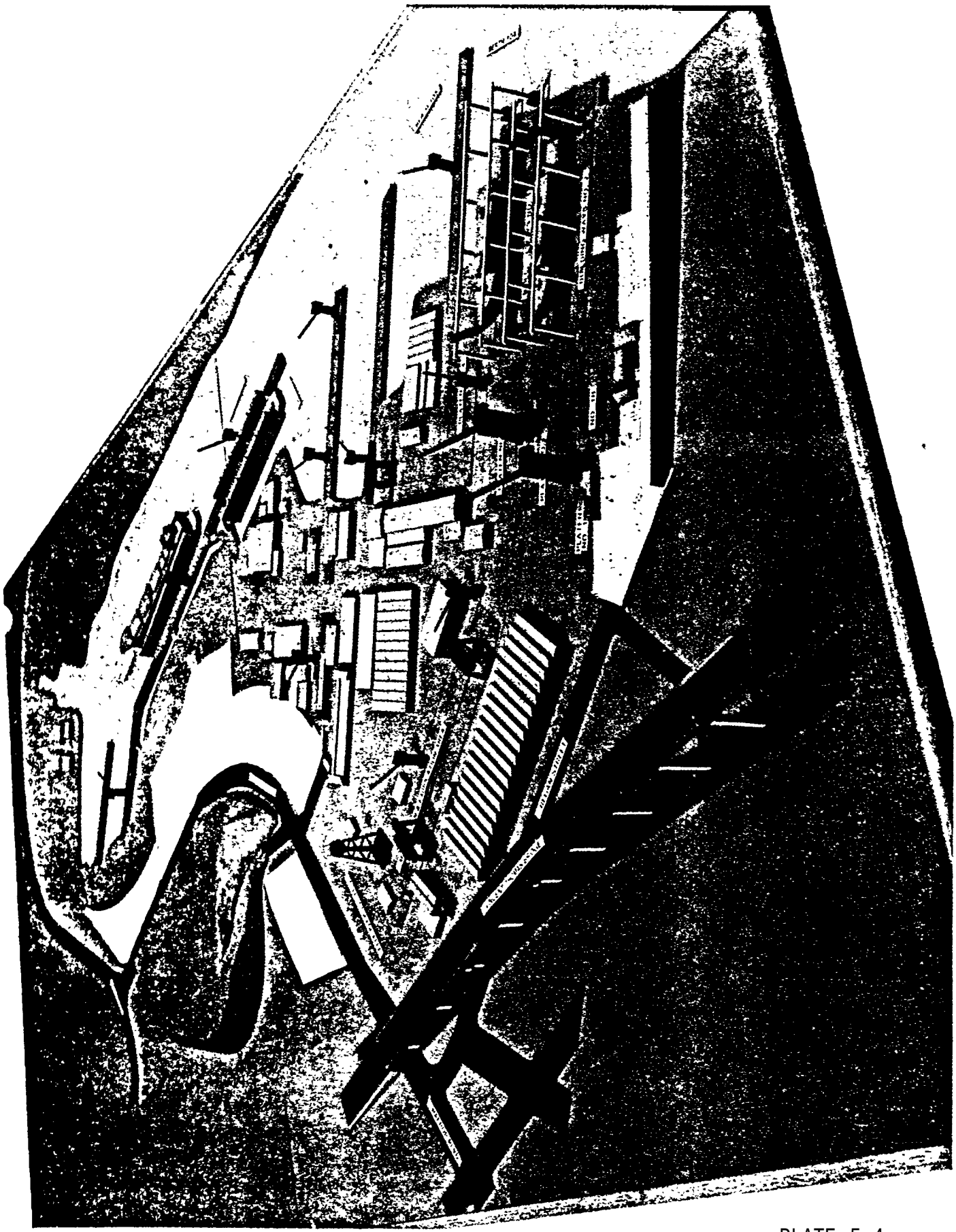


PLATE 5.4

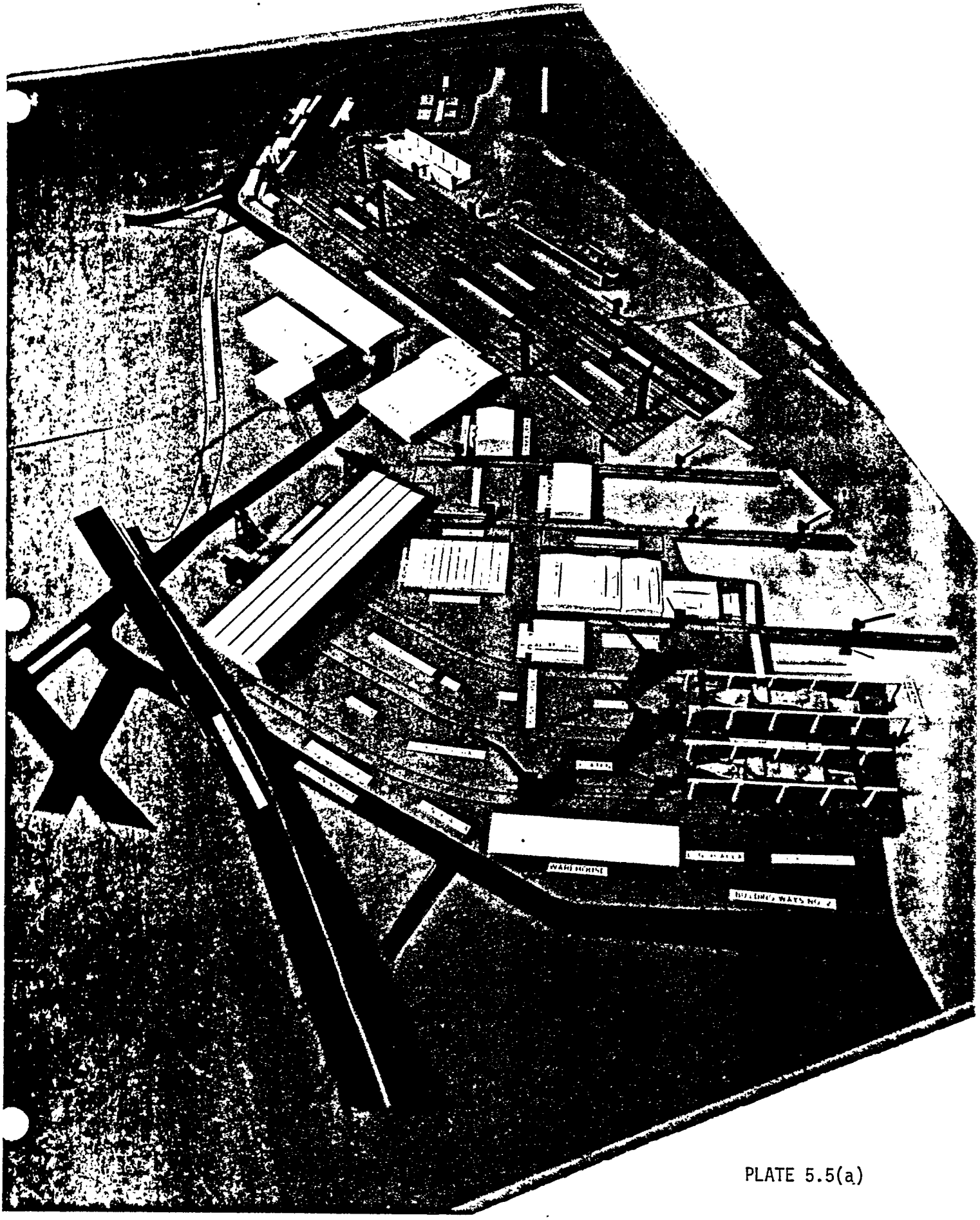


PLATE 5.5(a)

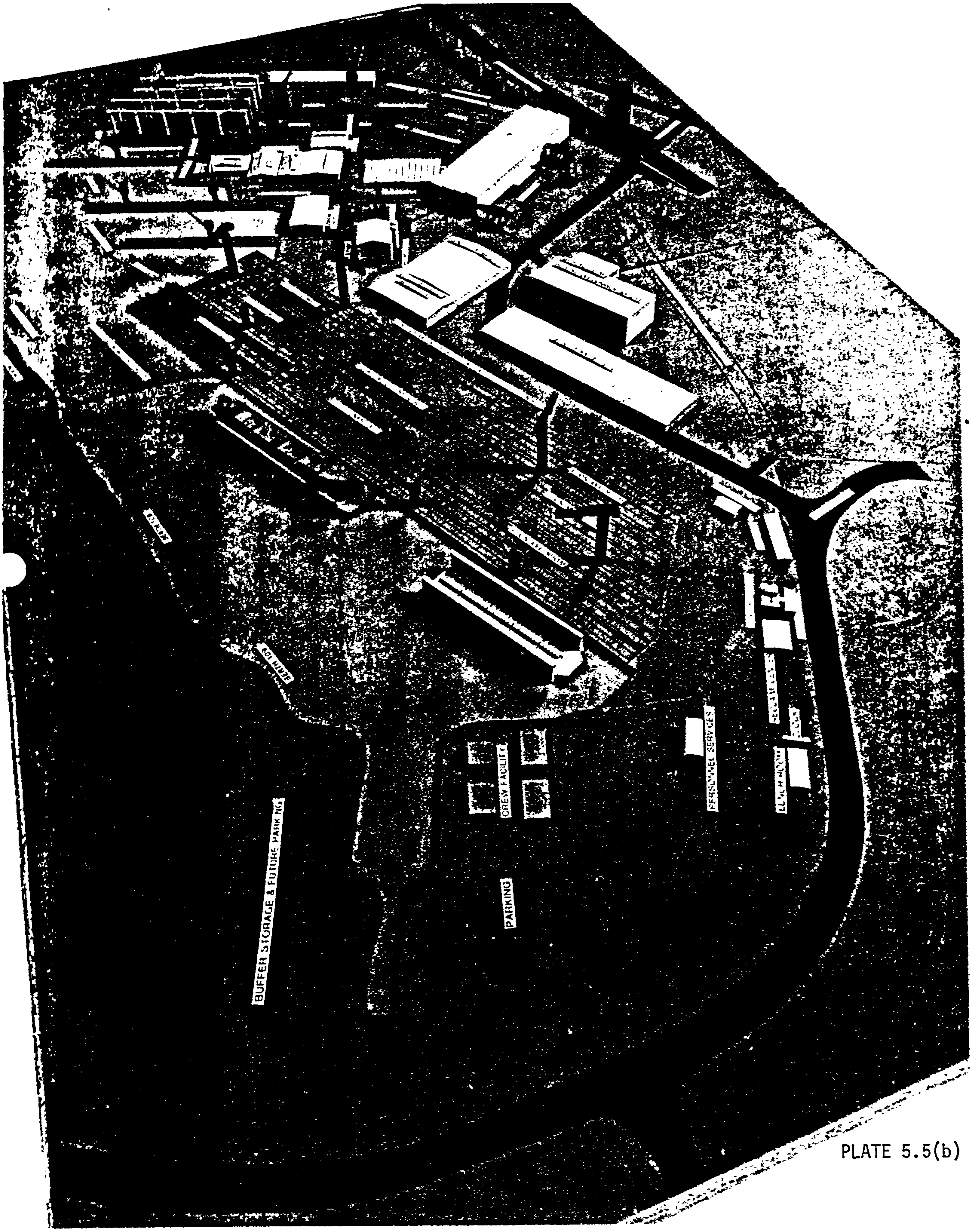

BUFFER STORAGE & FUTURE PARKING
PARKING
CREW FACILITY
PERSONNEL SERVICES

PLATE 5.5(b)

SECTION VI.

IMPLEMENTATION PLAN

AS a result of this current long-range facilities plan, two major improvements are now underway.

In the area of physical facilities a new land level ship new construction and repair area is being developed. This facility consists of:

- A ship lift platform 105 feet wide and 655 feet long capable of lifting a ship displacing 22,000 plus long tons out of the water up to land level.
- A transfer system capable of moving the ship from the lift to berthing areas.
- Up to five onshore work bays where the ship is parked during its availability (with space allocated for two additional work bays).
- Shops, warehouse space, blast grit storage and reclamation equipment and all the appropriate supporting utilities.

In the area of data management the yard is moving ahead toward establishing a CAD/CAM system in-house. This system is to consist of:

- A technical data center comprising a host-central processing unit (CPU) with a Prime, Model P750 computer,

mag disk storage, mag tape drive, line printer, radial plotter and video terminals.

- A second Prime Computer and peripherals which will support an automated tool control system, an employee time/attendance control system, and serve as a backup to the primary technical data center computer.
- CAD/CAM system with graphics work stations and dedicated disk storage.
- Software support including AD-2000 advanced engineering system with numerical control package Autokon 79 and Vision management data system.

Todd Los Angeles has already purchased and has in-house a Gerber Scientific flatbed plotting table with a 6 ft. by 16 ft. bed.

In addition to the major long term projects now underway there are several major maintenance type projects in progress.

- Upgrading administrative engineering and shop office areas.
- Renovation of existing piers.
- Renovation and upgrading of electrical and mechanical services available at existing berths.

The following narrative schedule subdivides the long-range plan principal activities into short-term, intermediate-term and

long-term groups. Plates 6.6-1, 6 .1-2 and 6.1-3 are composites of all three phases in a bar chart format.

Short-Term (l-3 years)

The short-term plan calls for:

- Removal of Piers E and F.
- Relocate blast grit and handling system including railroad spur.
- Construct a new extension of Pier D from the western shoreline to the existing Pier D, including utilities, dredging and Dry Dock No: 1 support structure.
- Relocate Dry Dock No. 1.
- Fabricate and install ship lift and transfer system including dredging, support piers, side transfer rail system and utilities.
- Install Work Bays No. 1 and No. 2 including tracks and utilities.
- Install a salvage reclamation center.
- Construct new Gate No. 3 service buildings including Guard House, Clock House, Lunchroom and Administrative Service Building.
- Construct a Garage with motor pool area.
- Construct Repair Office/Shop/Warehouse.
- Construct side transfer rail bed in preparation for constructing Work Bay No. 3.
- Start construction of Work Bay No. 3.

Intermediate-Term (4-10 years)

Complete construction of Work Bay No. 3 including utilities.

Construct Work Bays No. 4 and No. 5.

Construct pier for No. 16 Craneway, west side of Way No. 2

Purchase and install Crane No. 16, 175-ton whirley.

Relocate water tower.

Construct landward No. 16 Craneway.

Construct Painters and Laborers Shop.

Construct Ways Warehouse on Regan Street.

Revise Steel Yard and install new crane.

Construct Steel Shop.

Rebuild Machine Shop.

Construct Aluminum Shop using existing Steel Shop.

Relocate Pipe Shop into existing Warehouse No. 1.

Construct Blast and Paint Hall.

Construct Electric Shop.

Construct Central Warehouse.

Construct Sheet Metal Shop.

Construct Central Tool Control.

Construct Joiner/Maintenance Shop.

Start construction of Repair Warehouse and offices extension.

Long-Term (11-20 years)

- Complete Repair Warehouse and office extension.
- Construct side transfer rail bed in preparation for constructing Work Bays No. 6 and No. 7.
- Construct Work Bays No. 6 and No. 7.
- Construct Administration Building with parking.
- Complete construction of the Steel Shop.

LONG-RANGE PLAN Part 1

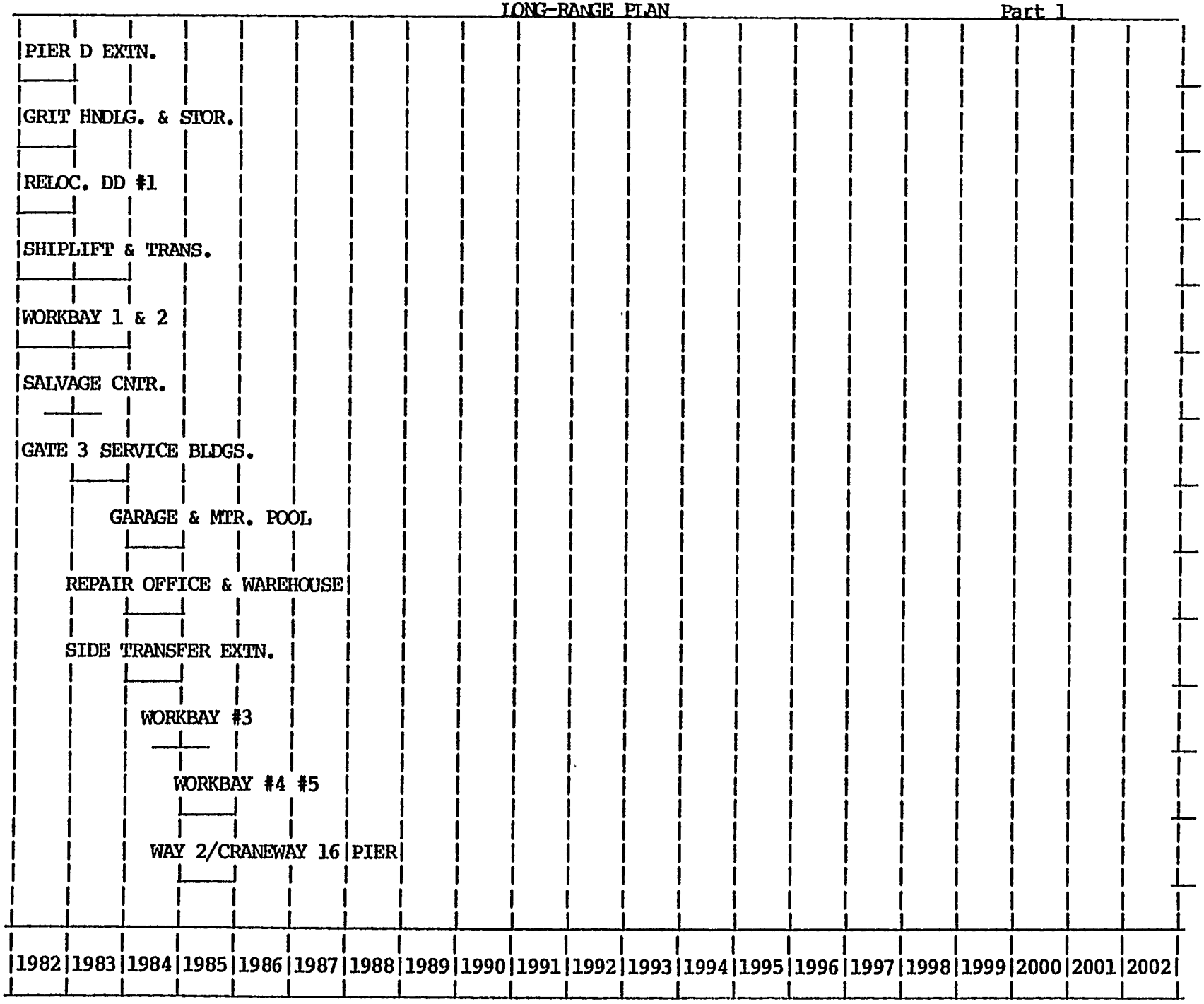


Plate 6.1-1

LONG-RANGE PLAN Part 2

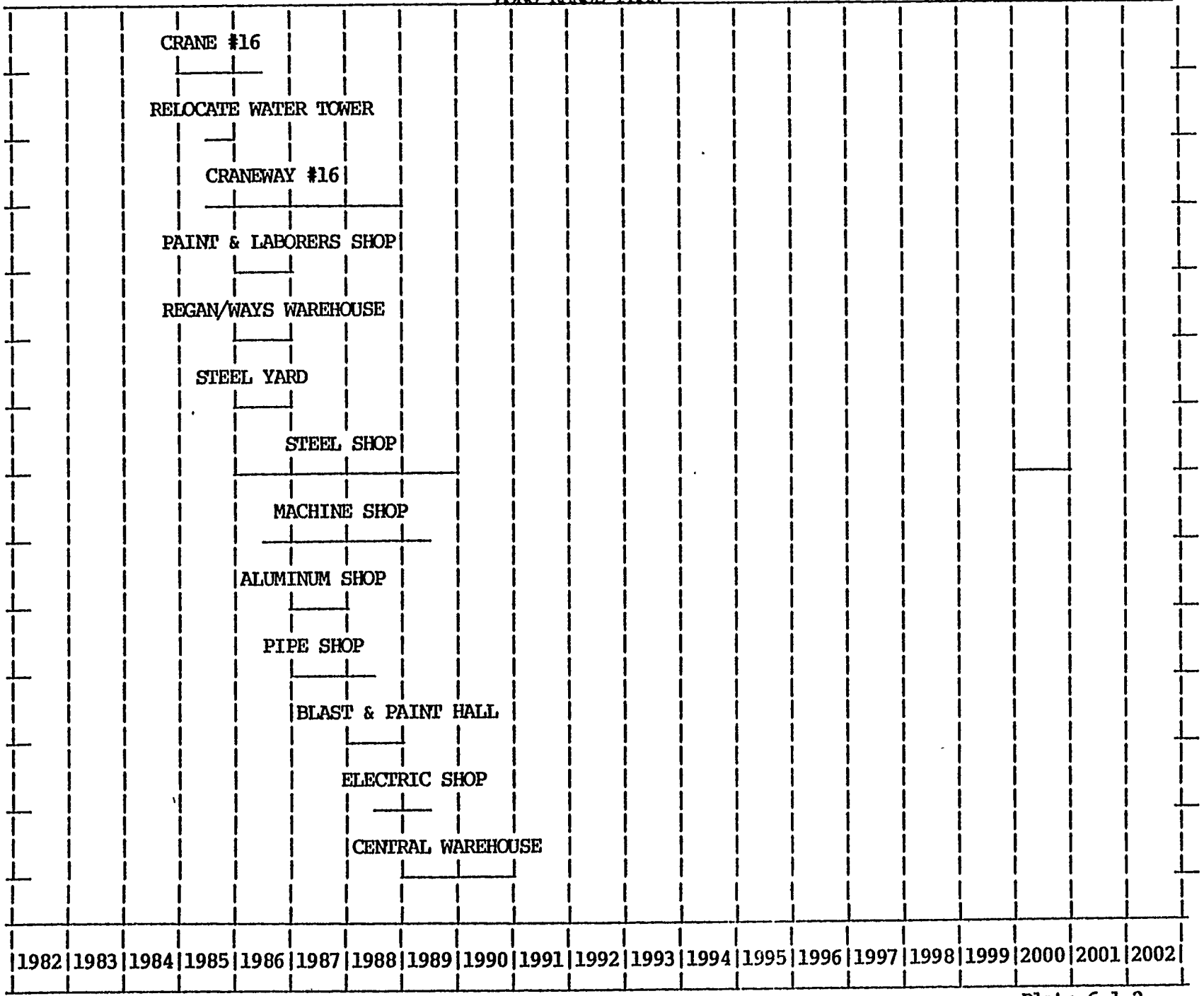


Plate 6.1-2

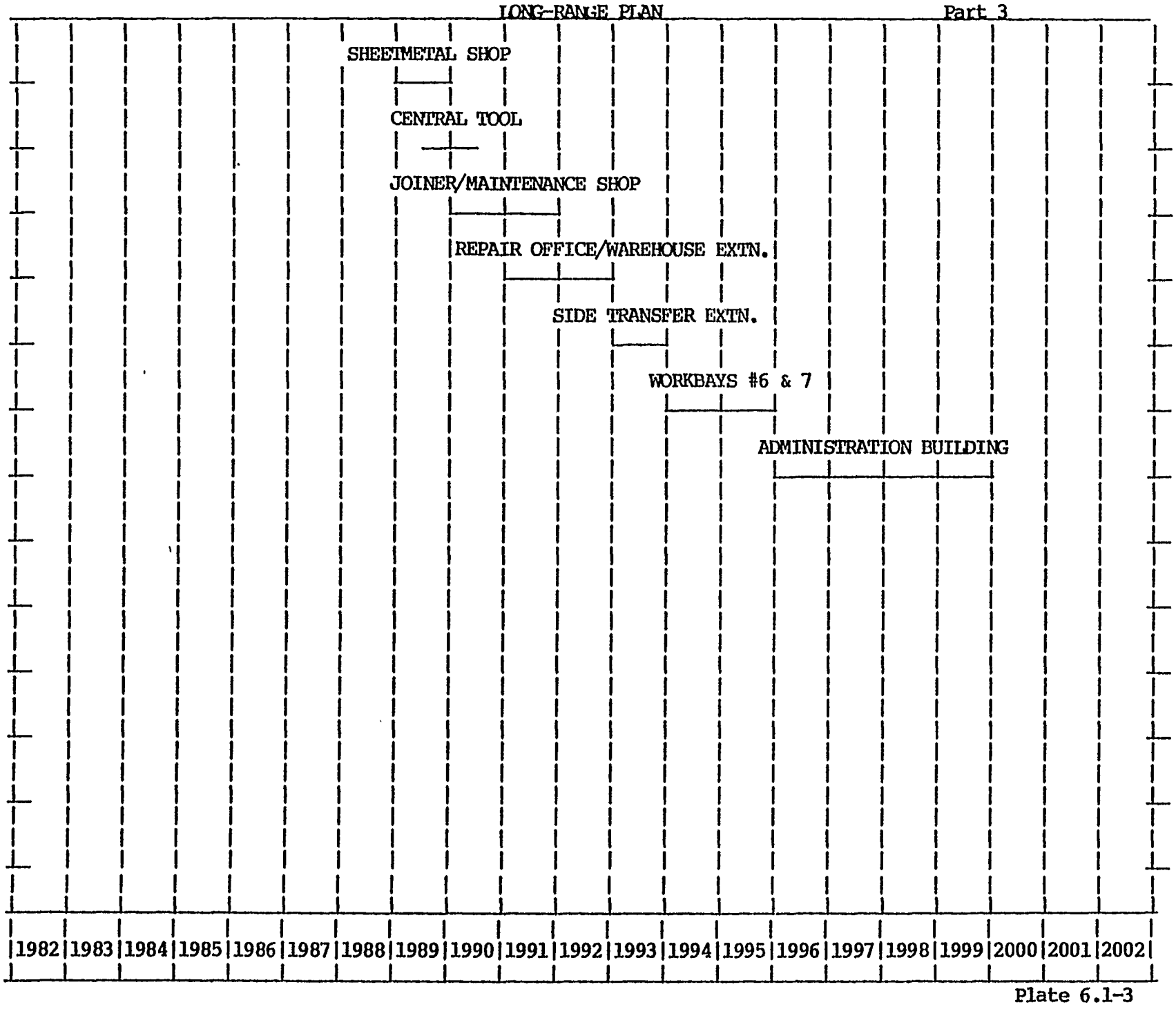

SHEETMETAL SHOP
CENTRAL TOOL
JOINER/MAINTENANCE SHOP
REPAIR OFFICE/WAREHOUSE EXTN.
SIDE TRANSFER EXTN.
WORKBAYS #6 & 7
ADMINISTRATION BUILDING
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

Plate 6.1-3

SECTION VII.

LONG-RANGE BUDGET PLAN TO IMPLEMENT FACILITY PLAN

Plate 7.1 is a budget plan based on the long-range plan schedule (Plates 6.1-1, 6.1-2 and 6.1-3).

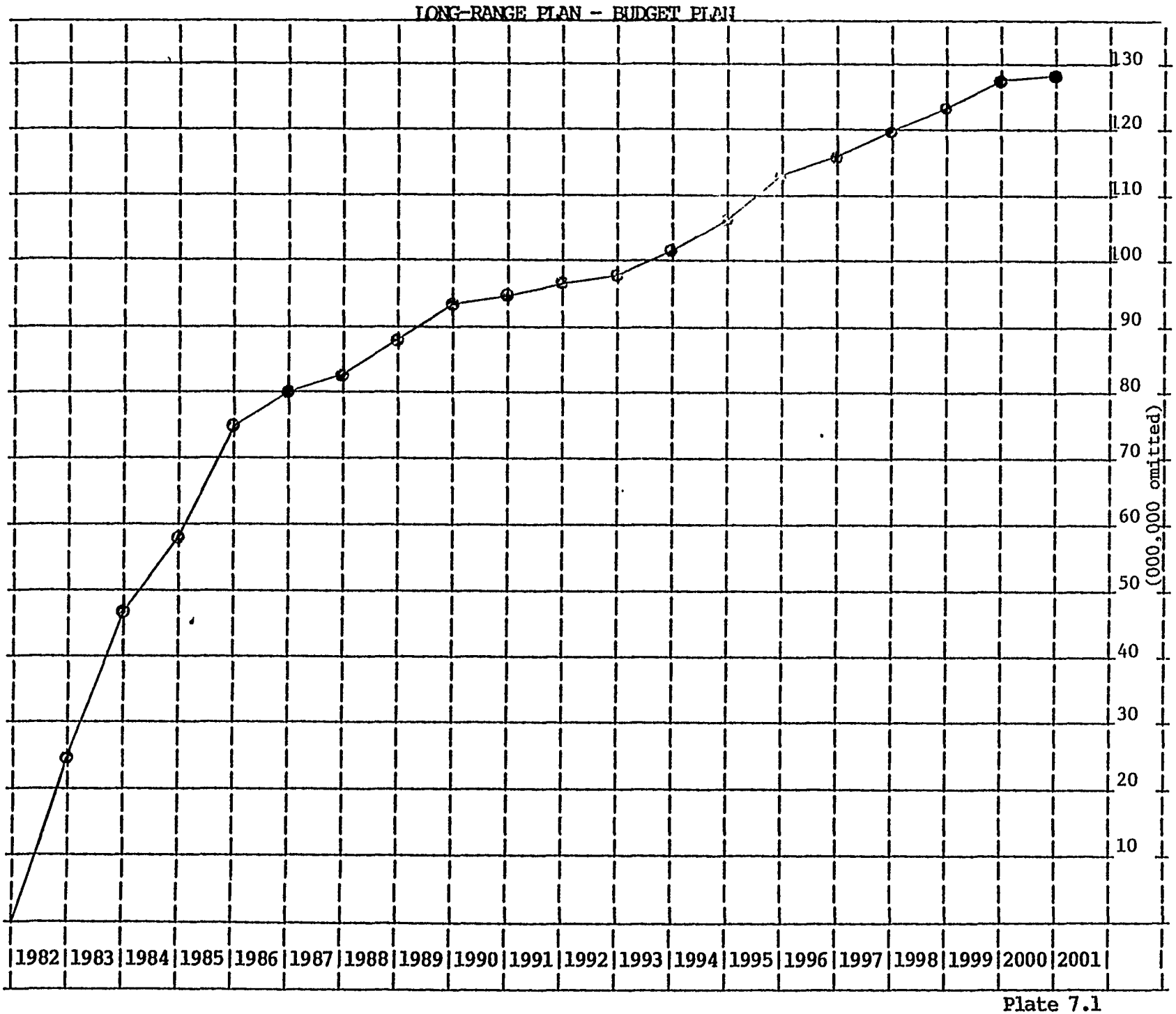

LONG-RANGE PLAN - BUDGET PLAN
130
120
110
100
90
80
70
60
50
40
30
20
10
(000,000 omitted)
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001

Plate 7.1

SECTION VIII

JUSTIFICATION

The economic justification of the short-term plan for the ship lift system is included as Appendix A to this report.

The actual selection of the ship lift system supplier is summarized in Appendix B, the ship lift selection review prepared by Shiptech International, Inc.

Plates 9.7-1, 9.7-2 and 9.7-3 are a summary of the existing buildings at Todd Los Angeles. The age of many of the existing structures makes extensive reconstruction or replacement almost mandatory somtime during the next twenty years.

SECTION IX.

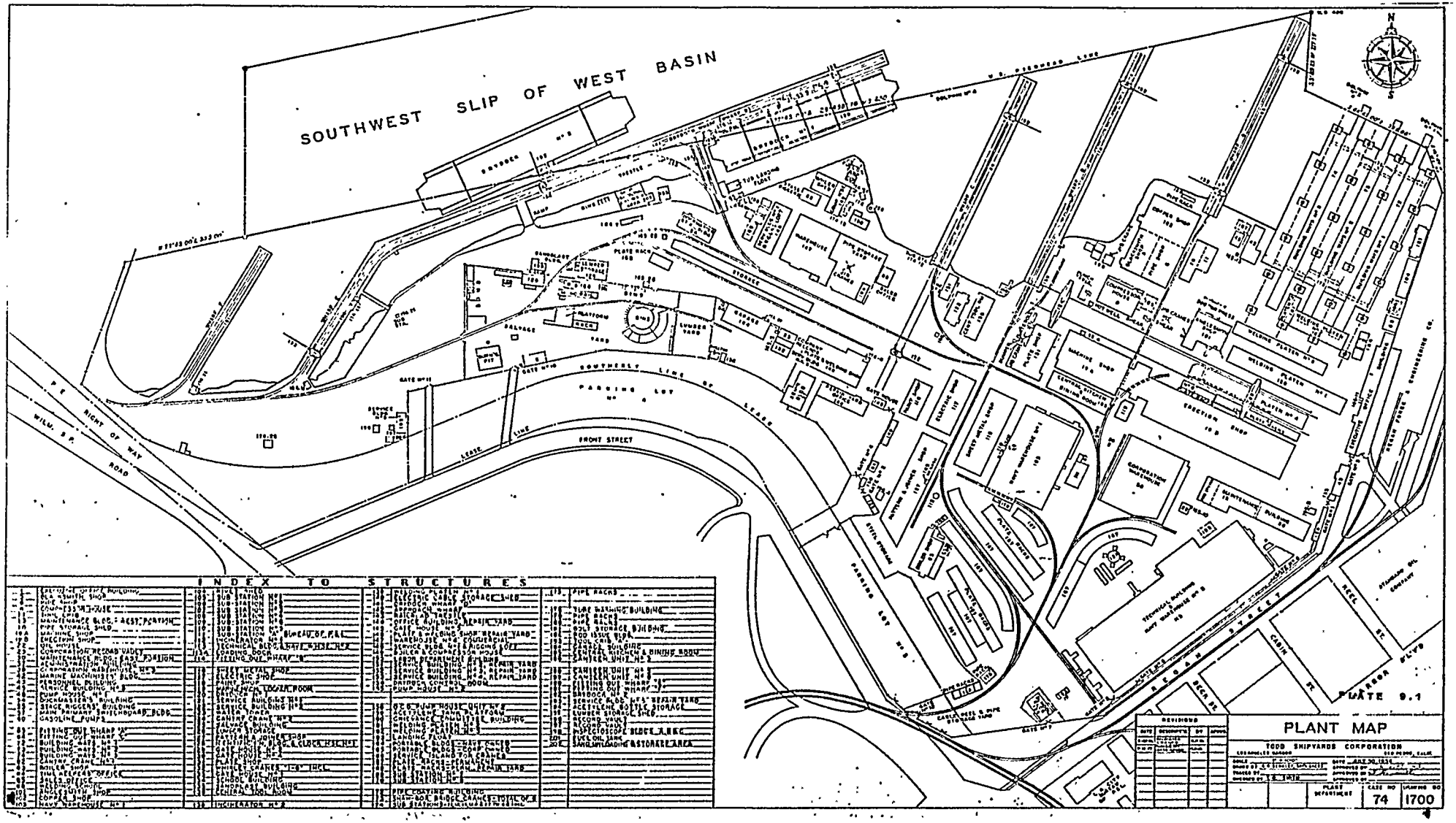
BACK-UP DATA ON EXISTING FACILITY

Plates 9.1, 9.2, 9.3 and 9.4 are yard maps from 1957 to the present. These maps are described in Section V.

Plate 9.5 is a summary of the current lease area.

Plate 9.6 is a summary of the current land area utilization.

Plates 9.7-1, 9.7-2 and 9.7-3 are a summary of the existing buildings.



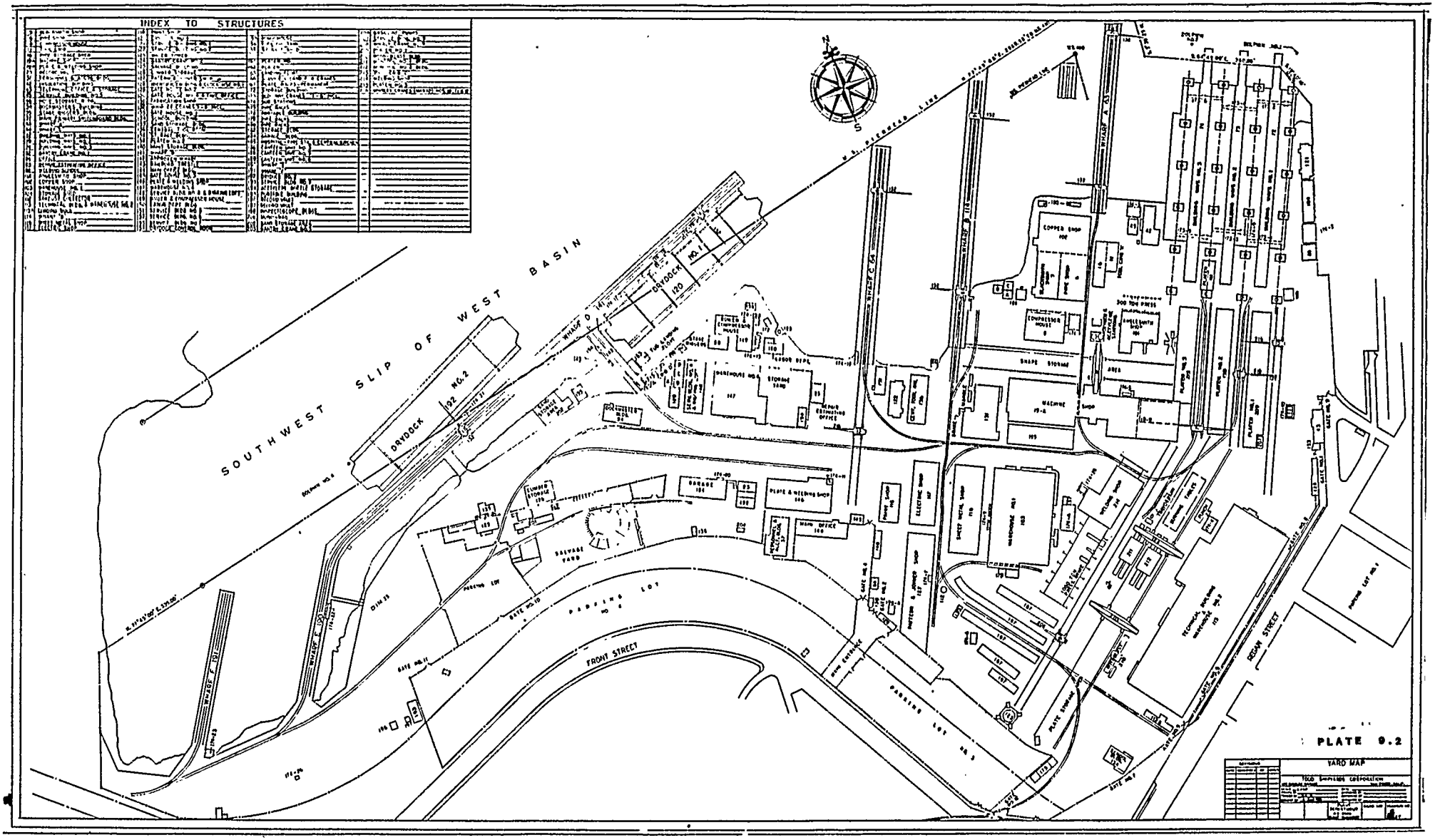
INDEX TO STRUCTURES

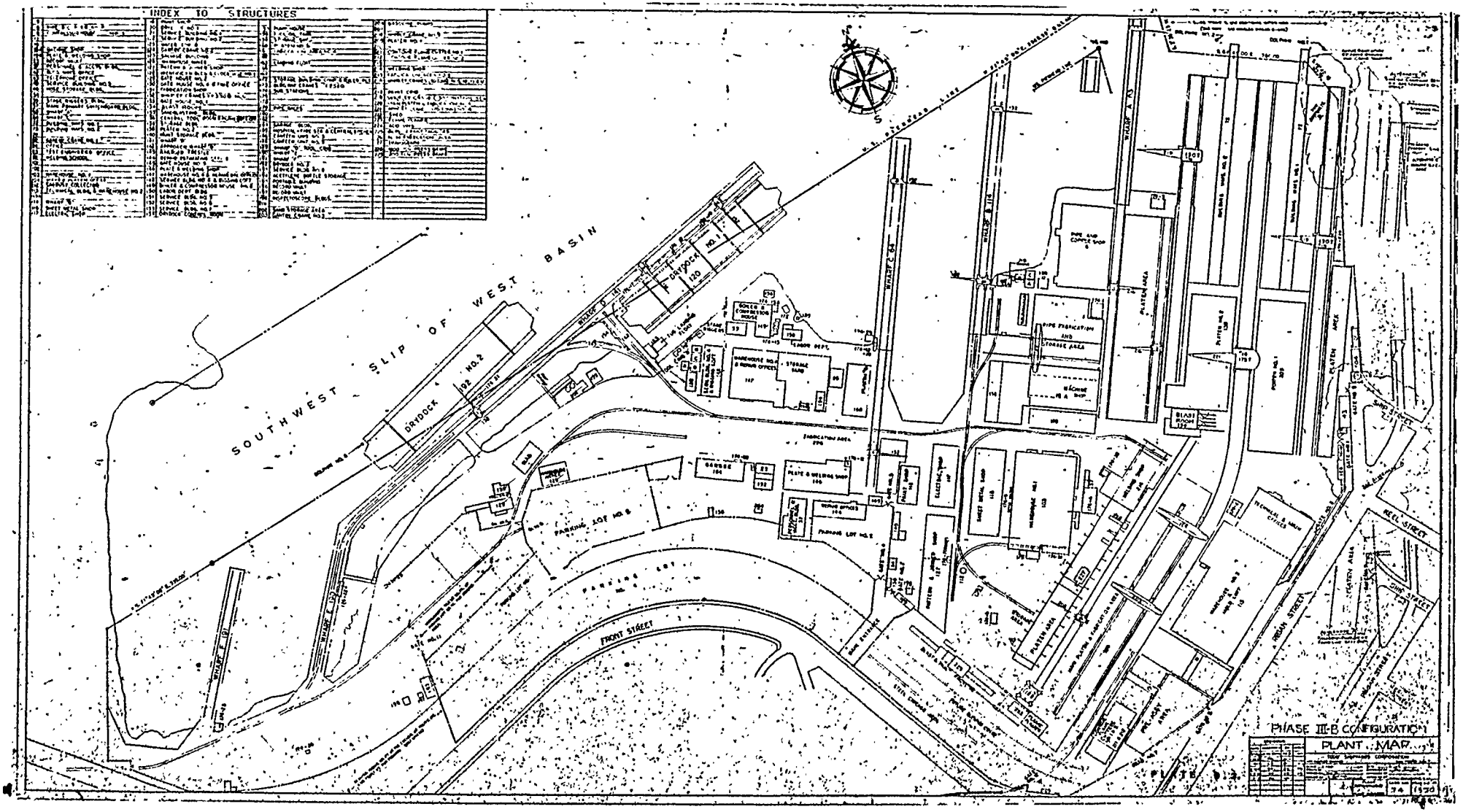
PLATE 9.1

PLANT MAP

TODD SHIPYARDS CORPORATION

CASE NO	DRAWING NO
74	1700


INDEX TO STRUCTURES
SOUTHWEST SLIP OF WEST BASIN
DRYDOCK NO. 2
DRYDOCK 120
FRONT STREET
CEDAR STREET
PLATE 9.2
YARD MAP


INDEX TO STRUCTURES
SOUTHWEST SLIP OF WEST BASIN
DRYDOCK NO. 2
DRYDOCK NO. 1
FRONT STREET
PARKING LOT NO. 2
PARKING LOT NO. 3
PHASE III-B CONFIGURATION
PLANT MAP

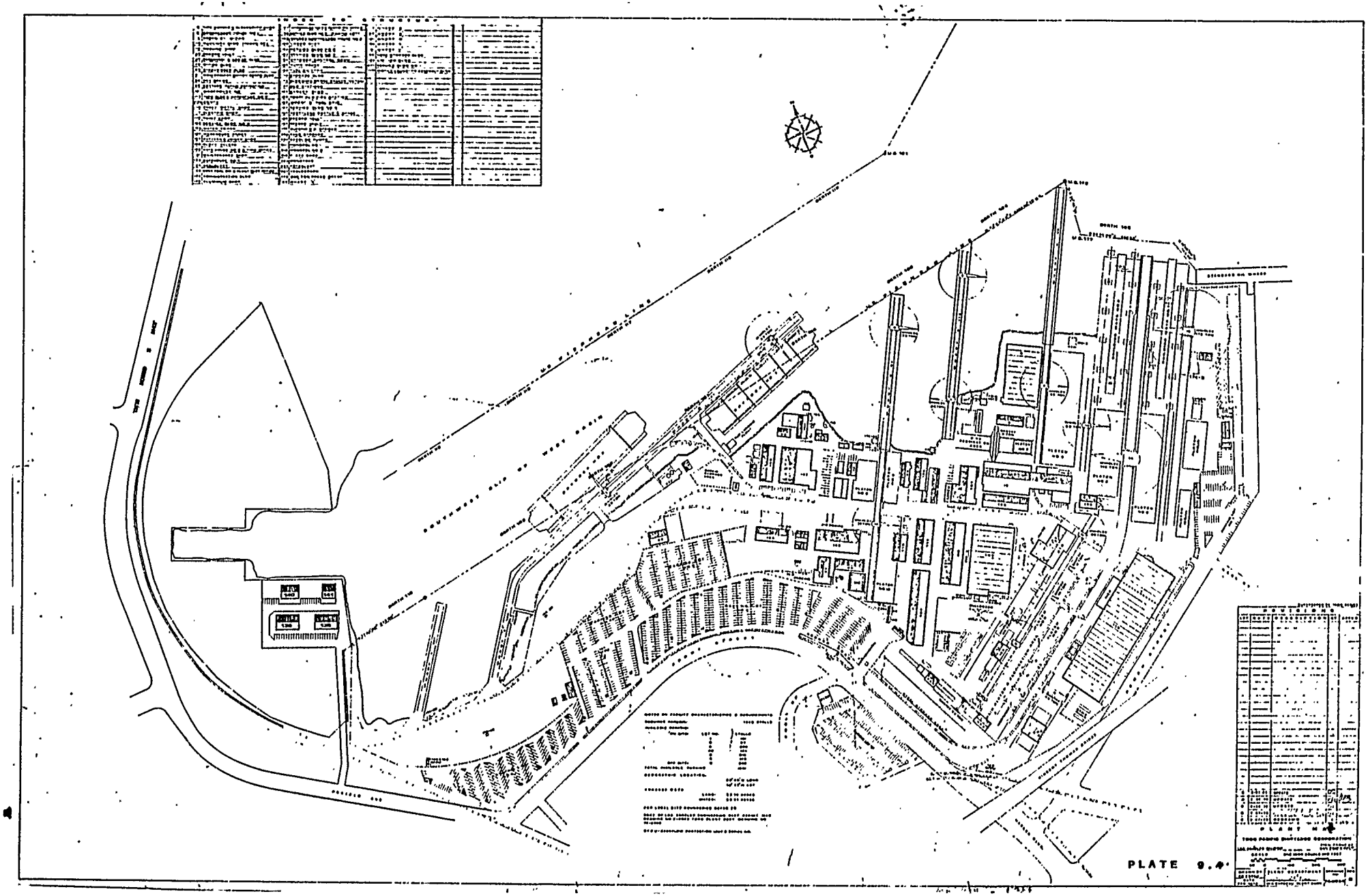


PLATE 9.4

CURRENT TPLA LEASE AREA

	* Water	* Land
Basic Lease 2-1947.	1,048,216	2,858,227
Regan Forge area 5-4415		130,889
Hatch parking 5-4354		69,529
Front St. - Pacific Avenue corner 5-4355		93,141
RR right of way, Todd spur		1,321
Pier D, E, F and Dry Dock No. 2	156,174	-
Sun Lumber, SW sect.		329,759
Sun Lumber, NW sect. (lease effect. August 1981)		374,659
TOTAL	1,204,390	3,857,525
Sq.ft. divided by 43,560 = Acres	27.65	88.56

* All areas are quantified in square feet unless otherwise noted.

CURRENT AREA UTILIZATION

Summary

Activity	Land Area	% of Total
Buildings	413,904	11.9
Semiautomatic material handling (outside)	43,650	1.3
Material preparation & subassembly (outside)	79,175	2.3
Hull unit assembly (outside)	276,725	7.9
Dedicated storage (outside)	159,322	4.6
Hull unit outfitting	61,950	1.8
General storage	467,900	13.4
Utility stations	13,691	.4
Shipways	144,000	4.1
Parking	906,881	26.0
Craneways - roadways - railways	836,905	24.0
Ship's crew facilities	78,763	2.3
TOTAL YARD AREA (land)	3,482,866	

* All areas are quantified in square feet.

SUMMARY OF EXISTING BUILDINGS

Building Number	Building Description	Year Built	Land Area	Floor Area
6	Blacksmith Shop	1918	(w/Pipe & Copper)	(w/Pipe & Copper)
6	Pipe & Copper Shop	1941	30,800	33,800
8	Compressor Bldg. No. 1	1938	3,675	3,675
11	Regan Office	*	1,800	3,600
lla	Welding Engineer Office	*	800	800
19	Machine Shop	1917	32,300	32,750
23	Record Storage	1918	1,125	1,125
37	Personnel & Accounting	1918	5,100	9,816
43	Office & Classrooms	1919	1,900	3,400
55	Stageriggers Shop	1919	1,500	1,500
57	Main Switchboard	1922	528	528
84	Pay Office	1941	600	600
85	Office	1942	1,575	1,575
103	Warehouse	1941	40,400	51,200
113	Technical Offices & Warehouse	1941	93,500	213,080
l13a	Technical & Shop Office	1944	4,375	12,750
l13b	Missile Launcher Assembly	1978	2,450	2,450
116	Sheetmetal Shop	1942	18,400	18,400
117	Electric Shop	1942	10,725	10,725
118	Paint & Labor Shop	1942	5,000	6,000
122	Service Building No. 2	1943	3,470	5,120
123	Water Storage	Unkn.	2,500	

*NO records available

Plate 9.7-1

Building Number	Building Description	Year Built	Land Area	Floor Area
125	Cm 100 Building	1975	2,700	2,700
126	Warehouse	1942	3,500	3,750
127	Joiner/Shipwright Shop	1943	17,855	28,391
129	Clock House	1942	825	825
130	Gate House	1942	300	300
131	Maintenance shop	1943	11,400	18,477
133	Gate House	1942	300	300
134	Vacublast Bldg. w/Recov.	1973	5,375	3,375
136	Central Tool & Plant Office	1943	5,400	9,130
144	SupShip Office (inc. 145)	1942	4,800	4,800
145		1981	4,200	4,200
146	Aluminum Shop	1943	14,100	14,100
147	Repair Offices & Warehouse	1943	17,950	17,950
148	Riggers Shop & Service Bldg.	1943	6,720	6,720
149	Compressor & Steam Generators	1943	6,520	6,520
150	Labor Department	1943	1,500	1,500
152	Service Building	1943	1,250	1,250
153		1940	1,067	1,067
155	Pump House	1943	64	64
172	Storage Building	1945	150	150
184	Garage	1945	6,250	6,250
185	Fire Station-Hospital	1945	9,000	18,000
189	Wharf "D" Tool Room	1945	1,250	1,250
193	Service Building	1945	1,375	1,375
196	Record Vault	1945	300	300

Building Number	Building Description	Year Built	Land Area	Floor Area
197	Record Vault	1945	180	180
210	Office Building	1978	1,800	1,800
211	Monopole Building (inc. 212)	1959	5,600	5,600
214	Plate Shop	1960	13,000	13,000
223	CM 95 Building	1974	2,400	2,400
225	Rotoblast	1974	3,000	3,000
871	Service Building	1977	1,250	1,250
	TOTAL		413,904	592,868

FEASIBILITY OF PROPOSED YARD IMPROVEMENTS PROGRAM TODD PACIFIC SHIPYARDS CORPORATION

FINAL REPORT

July 15, 1980

Prepared for:

TODD SHIPYARDS CORPORATION

By:

International Maritime Associate, Inc.
1800 K Street, N.W.
Washington, D.C. 20006

APPENDIx A

NOTE

This Report has been modified by removing narrative and exhibits which do not relate to the Los Angeles Division.

Exhibits marked thus (*) on the List of Exhibits are not included.

TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF EXHIBITS
(continued)

LIST OF EXHIBITS
(continued)

LIST OF EXHIBITS
(continued)

EXECUTIVE SUMMARY

Principle findings and conclusions are as foilows:

- Cargo throughput has been increasing at each of the three West Coast locations, with particularly strong growth at Los Angeles

- Ship arrivals have been increasing over the past ten years at Los Angeles and Seattle and for the past five years ship arrivals have grown at San Francisco

- As change in shipping technology has leveled, ship arrivals in the future should grow as fast as, or faster than, cargo throughput

- Dollar value of commercial vessel casualties on the West Coast grew 38% over the period 1969-1978

- For the most recent year for which we have complete data (1977), Todd-Pacific accounted for 31 percent of all topside jobs and 37 percent of drydock jobs on the West Coast

- Todd-Seattle obtains the largest percent (84%) of R&A work from commercial jobs, and Todd-Los Angeles obtains the greatest percentage (47%) of work from foreign customers

- The greatest competition is experienced by Todd-San Francisco, where there are five yards with drydocking capability and eight topside yards

- Trends in international labor costs and exchange rates favor future competitive position of U.S. yards

- Propensity to repair index is similar at each of the three locations, and no upward or downward trend is discernible

- Todd commercial R&A sales prospects are projected to grow 21 percent over the next ten years

- Naval overhaul work is expected to be significant over the next decade, with 4-5 active naval ship overhauls per year in each of the three locations

- A life cycle maintenance and overhaul contract for FFG's is a promising prospect for Todd-Los Angeles, producing revenue of $685 millian between 1985 - 1994

- A two berth Syncrolift at Todd-Los AngeIes, assuming a life cycle FFG maintenance contract, will produce significant return on investment

- The proposed large drydock at Todd-Seattle will produce positive net income after a five year period

1. INTRODUCTION

I. INTRODUCTION

In April 1980, Todd Shipyards Corporation commissioned international Maritime Associates, lnc. to analyze the present and future market for ship repair services on the West Coast. Additionally, IMA was directed to assess the financial feasibility of proposed yard improvements at Todd-Los Angeles and Todd-Seattle. This report presents our findings and conclusions.

1. THE STUDY OBJECTIVE: TO PROVIDE AN INDEPENDENT EVALUATION OF THE FUTURE SHIP REPAIR MARKET ON THE WEST COAST AND FINANCIAL FEASIBILITY OF PROPOSED) YARD IMPROVEMENTS

To effectively fulfil this objective, the following analyses were carried out:

- Review of the present and future market for ship repair serf ices on the West Coast;
- Review of proposed capital improvements planned for Todd-Los Angeles and Todd-Seattle;
- Evaluation of the financial viability of the proposed improvements, in light of anticipated future market prospects.

The financial feasibility was subiected to sensitivity tests, to determine the impact of varying the assumptions about future market or financial conditions.

2. DATA GATHERED FROM BOTH PUBLIC AND PRIVATE SOURCES FORM THE BASIS OF EVALUATION

The foI1owing organizations supplied data useful to the study:

- Department of the Navy
  Naval Sea Systems Command
  Washington, D.C.

- Department of Commerce
  Bureau of the Census
  Washington, D.C.

- Department of Commerce
  Maritime Administration
  Washington, D.C.

- Department of Commerce
  Bureau of Economic Analysis
  Washington, D.C.

- Department of Transportation
  U. S. Coast Guard
  Merchant Vessel Inspection Division
  Washington, D.C.

- Various West Coast Port Authorities
  and port associations

IMA staff visited each of the three yards and conducted interviews with key Todd officials. Further, Todd carporate and division management provided certain financial and market data which were of use to this study.

3. THIS REPORT IS DIVIDED INTO TWO SECTIONS: MARKET ANALYSIS, AND FINANCIAL EVALUATION

Chapter II provides a description of the present and future market for ship repair services on the West Coast – with particular emphasis on the Los Angeles, San Francisco, and Seattle markets. The aim of this chapter is to draw attention to sailent characteristics of the present market and to project, on the basis of recent trends, the future size, nature and composition of the West Coast market for vessel repairs.

Chapter III provides a *financial* evaluation of the specific improvements proposed for Todd-Las Angeles and Todd-Seattle. Pro forma financial statements have been prepared showing projected costs and revenues attributable to each of the proposed improvements.

II. MARKET ANALYSIS

II. ANALYSIS OF SHIP REPAIR MARKET: U.S. WEST COAST

The purpose of THis chapter is to examine the present market and to project the future market for each of the three Todd yerds on the West Coast.

1. THE MILITARY AND COMMERCIAL MARKETS FOR SHIP REPAIR ARE DRIVEN BY NUMEROUS FACTORS

The ship repair market is comprised of two sectors - commercial and government. Each sector has its own driving force.

Commercial sector demand is basically driven by the number of ships trading in the immediate vicinity of the repair yard. Relative cost and performance of specific yards influence yard selection in cases where shipowners have discretion in selecting a repair facility.

Government sector demand is driven by yard location and government policy regarding homeporting and operational budgets.

(1) Annual Cargo Throughput is A Major Barometer Of The Commercial Repair Market

Demand for ship repair and related services is derived from the demand functiion for marine transportation. Industrial demand for goods which must be moved by sea drives the demand for marine transport. industrial demand ultimately tends to dictate the shape, character and

scope of the industries which serve the maritime market.

Exhibit 11.1 shows the trend in annual cargo throughput for three major West Coast ports, 1968 to 1977 (1977 is the most recent year for which data are available). These data show Los Ageles

Todd Pacific Shipyards
Market And Economic Stuc.
Exhibit II. 1

TRENDS IN CARGO THROUGHPUT IN SHORT TONS
AT SELECTED WEST COAST PORTS
1968 - 1977

CALENDAR YEAR	LOS ANGELES 1/	SAN FRANCISCO 2/	SEATTLE 3/	TOTAL WEST COAST
1968	29,001,738	31,641,861	52,418,178	167,237,359
1969	42,765,903	38,603,947	54,798,900	179,713,716
1970	44,865,218	30,137,695	54,436,673	172,332,780
1971	44,188,516	26,471,735	47,443,069	162,607,128
1972	44,631,740	28,014,606	52,867,405	173,138,197
1973	53,110,513	34,035,473	56,534,031	201,530,651
1974	52,813,134	28,758,913	51,633,885	191,363,783
1975	57,333,496	27,005,213	52,294,663	177,700,031
1976	62,388,598	32,243,867	59,388,121	200,765,089
1977	64,310,930	35,997,114	61,025,977	208,475,764
Index Of Growth (1968 = 100)	164.9	113.8	116.4	124.7

soure: WATERBORNE COMMERCE OF THE UNITED STATES, Calendar Years 1968 -1977, Part 5 - National Summaries. U.S. Army Corps Of Engineers.

Notes: (1) Inclusive of Los Angeles and Long Beach.
(2) Inclusive of San Francisco, Oakland, Richmond, Sacramento, Redwood City, and Stockton.
(3) Inclusive of Seattle and all other ports within the Puget Sound.

to be the leader in annual throughput, followed by Seattle and San Francisco. Los Angeles has also been growing more rapidly than the other Iwo ports.

(2) Commercial Vessel Arrivals Have Been Rising At Two Of Three West Coast Ports

Exhibit 11.2 provides trends in vessel arrivals at the three ports from 1970 to 1979. This exhibit shows that arrivals have increased at

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 2

TRENDS IN vESSEL ARRIVALS AT
THREE WEST COAST PORTS
1970 - 1979

Calender year	Los Angeles	San Fransisco	Seattle
1970	5343	4931	2481
1971	4227	4099	1810
1972	4718	4330	2249
1973	5019	4465	2338
1974	4829	3844	2035
1975	4804	3698	2038
1976	5071	3785	2338
1977	5546	3887	2581
978	6765	3974	2557
1979	6682	3988	3005
Index Of Growth (1970 = 100)	125.1	80.9	121.1
Average Annual Rate Of Growth	2.26	(2.10)	1.93

Source: International Maritime Associates, Inc., Washington, D.C. Based on data provided by the Port associations of each port.

an average annual rate of about two percent in Los Angeles and Seattle during the decade. In contrast, arrivals at the Port of San Francisco have declined by about two percent annually. It is significant,

however, that the arrivals in San Francisco have risen over the most recent five years.

(3) Characteristics Of Commercial Vessels Very Among The Three Ports

Exhibit 11.3 characterizes trends in commercial vessel arrivals at the three ports by net register tonnage (NRT). This exhibit indicates

Todd Pacific Shipyards
Market And Economic Study
Exhibit 11.3

ANALYSIS OF COMMERCIAL VESSEL TRAFFIC
AT THREE MAJOR WEST COAST PORTS
BY AVERAGE NRT
1974 - 1978

Calendar Year	Los Angeles	San Fransisco	Seattle
1974	9,344	9,716	8,147
1975	10,023	10,125	8,936
1976	12,495	11,402	11,569
1977	12,546	11,816	9,990
1978	11,312	10,487	9,745
Index Of Growth (1974 = 100)	121.1	107.9	119.6
Average Annual Rate Of Growth	3.9	1.5	3.6

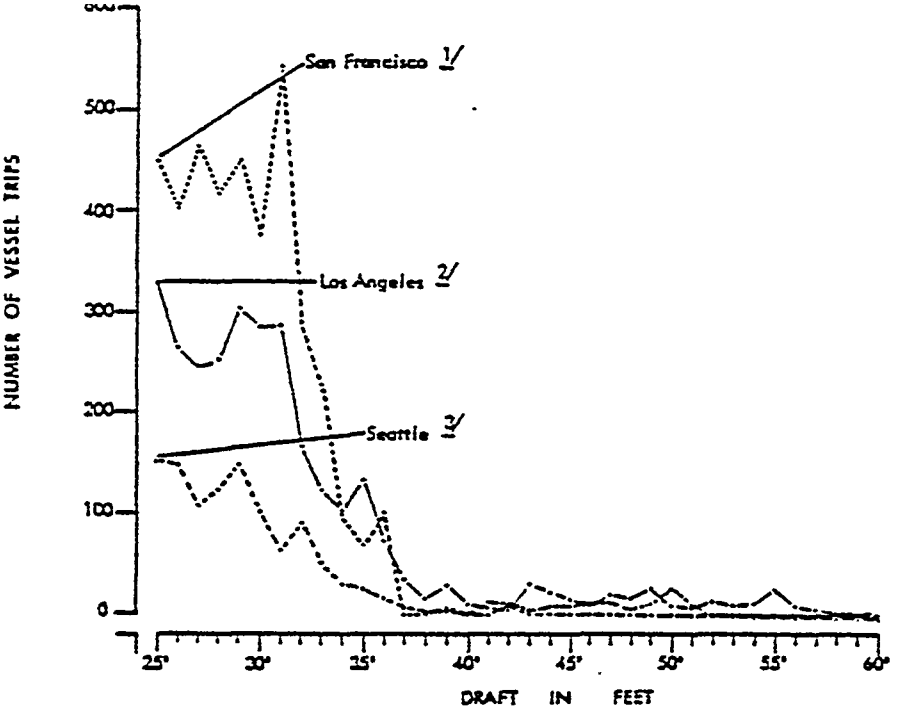
Source: Intetnational Maritime Associates, Inc., Washington, D.C. Based on data provided by the U.S. Department OF Commerce, Maritime Administraation, Office Of Trade Studies And Statistics, Division Of Economics Analysis.

that vessels have become larger over the five year period, but the trend toward increased size has leveled over the past two years.

Exhibit 11.4 presents an analysis of vessel traffic by draft. The

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 4

ANALYSIS OF VESSEL TRAFFIC AT
THREE MAJOR WEST COAST FORTS
BY DRAFT



Source: International Maritime Associates, Inc., Washington, D.C. Based on data from WATERBORNE COMMERCE OF THE UNITED STATES, Calendar Year 1977, Part 4 - Waterways And Harbors Pacific Coast, Alaska And Hawaii.

Notes: (1) Inclusive of San Francisco Bay, San Francisco Harbor and Oakland.
(2) Inclusive of Los Angeles and Long Beach.
(3) Inclusive of Seattle and other major ports of Puget Sound.

data indicate that Los Angeles has the greater percentage of deep draft vessels, as shown below:

	Number of Vessel Entries	
	under 30' draft	under 36' draft
Los Angeles	57.5%	85.4%
San Francisco	63.8%	94.5%
Seattle	71.2%	96.1%

(4) Estiimated Value (In Constant Dollars) Of Ship Casualties On The West Coast Has Increased By 32 Percent Over The 1969-1978 Period

A shown in Exhibit 11.5, the aggregate estimated dollar value (in 1978 dollars) of ship casualties on the West Coast has risen from S37 million in 1969 to $41 million in 1978. This is an increase of 32 percent.

Exhibit 11.6 shows the breakdown of these casualties, by type of mishap. Grounding are the largest component of the casualiy total.

ESTIMATED DOLLAR VALUE OF COMMERCIAL VESSEL CASUALTIES:
TOTAL U.S. VERSUS U.S. WEST COAST
FY-1969 — FY-1978

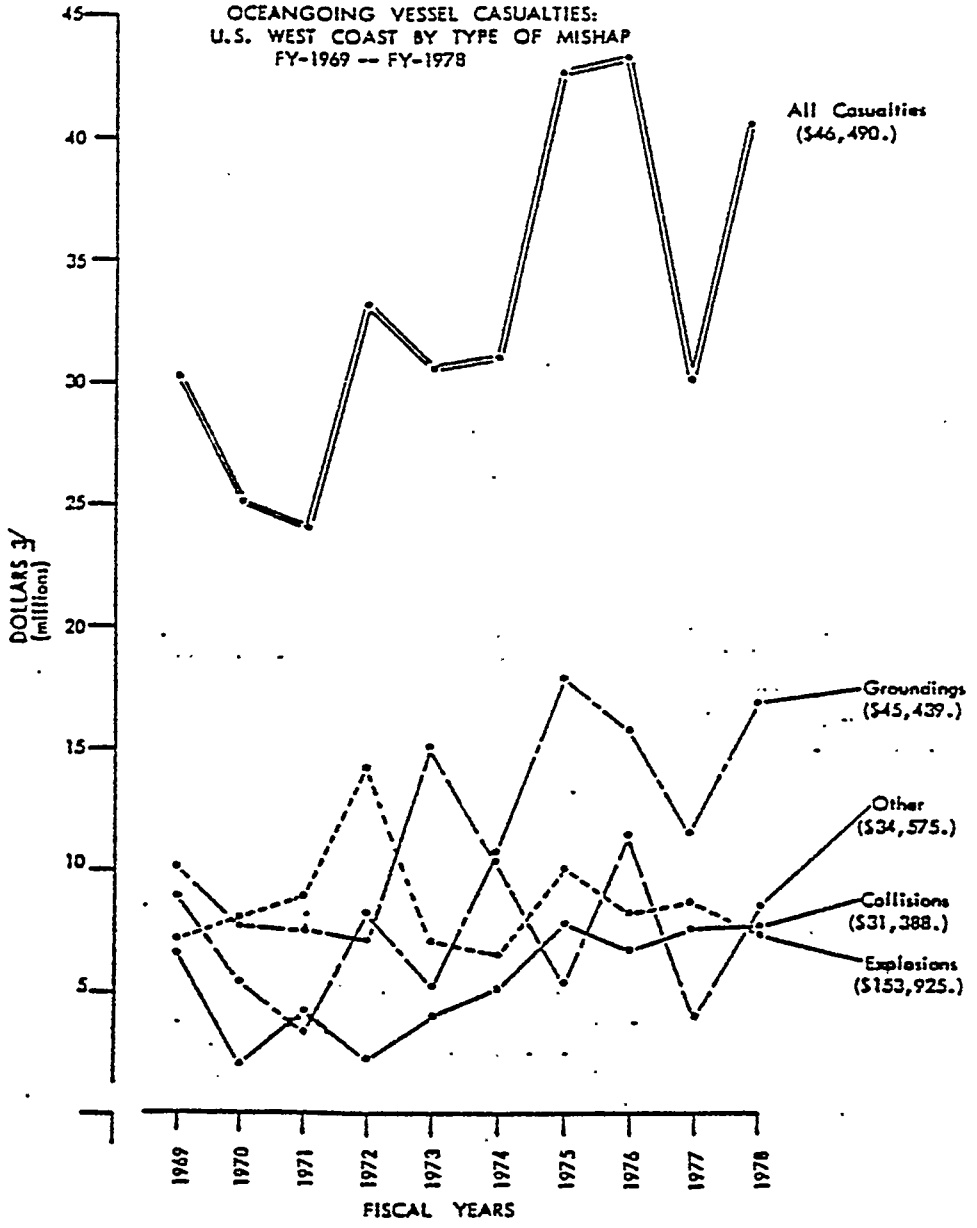
	Aggregate Estimated Dollar Value Of Vessel Casualties (millions)		
	TOTAL U.S.	U.S. WEST COAST	WEST COAST AS PERCENT OF U.S. TOTAL
1969	119.8	31.1	26.0
1970	115.2	25.1	21.7
1971	125.1	24.6	19.6
1972	125.4	33.4	26.6
1973	117.7	31.9	27.0
1974	132.5	32.7	24.7
1975	178.0	42.7	24.0
1976	193.0	44.4	23.0
1977	149.4	31.9	21.3
1978	169.0	40.9	24.2
Index Of Growth (1969 - 100)	141	132	—

Source: International Maritime Associates, Inc., Washington, D.C. Based on data provided by the U.S. Coast Guard, Merchant Vessel Inspection Division, Washington.

Notes: (1) Fiscal years, October 1 — September 30, 1969 — 1978.
(2) Dollar amounts stated in millions of constant 1978 dollars.
(3) West Coast states: Washington, Oregon, and California.

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 6

ESTIMATED DOLLAR MAGNITUDE OF COMMERCIAL OCEANGOING VESSEL CASUALTIES: U.S. WEST COAST BY TYPE OF MISHAP FY-1969 -- FY-1978



Source: International Maritime Associates, Inc., Washington, D.C. Based on data provided by the U.S. Coast Guard, Merchant Vessel Inspection Division, Washington.

Notes: (1) Fiscal years, October 1--September 30, 1969-1978.
(2) Figures in quotations reflect ten year average estimated dollar costs per repair per category of mishap.
(3) Dollar amounts stated in millions of constant 1978 dollars.

2. TODD-PACIFIC HAS HAD A STRONG POSITION IN THE WEST COAST MARKET OVER THE PAST DECADE

Each of the three yards has been a significant factor in the West Coast ship repair market, with each yard exhibiting different performance in top-side\drydock work and U.S./foreign owner work.

(1) Repair And Alteration Sales At Todd-Pacific Have Risen Over The Most Recent Three Year Period For Whi ch Ful Year Data Are Available

A shown in Exhibit 11-7, Todd-Pacific R&A sales increased from S50 million in 1977 to $91 million in 1979. Complete FY data for 1980 are not available at this time, but figures through the first three quarters show sales of $61 million.

Exhibit 11-8 shows a breakdown of jobs and R&A sales by each of the three yards. Over the most recent nine months Todd-Los Angeles has accounted fix 60 percent of R&A sales.

COMPARATIVE TOTAL SALES PERFORMANCE AT THREE DIVISIONS
OF TODD PACIFIC SHIPYARDS
FY - 1976 -- FY- 1980

	FY - 1976		FY - 1977		FY - 1978		FY - 1979	
	No. Jobs	Sales Amt.[2/]	No. Jobs	Sales Amt.	No. Jobs	Sales Amt.	No. Jobs	Sal
LOS ANGELES	113	$16.6	108	$ 7.6	175	$23.2	157	$
SAN FRANCISCO	223	$34.8	180	$26.0	119	$32.3	129	$4
SEATTLE	445	$19.2	459	$16.4	527	$26.5	462	$3
AGGREGATE TOTALS:	701	$70.6	747	$50.0	021	$82.0	748	$9

Source: International Maritime Associates, Inc., Washington D.C. Based on data provided by the manangement of Todd Shipyards Corporation.

Notes: (1) Data reflect FY- 1980 through the firstr three quarters only.
(2) Sales amounts rounded to nearest million.

COMPARATIVE SALES AND WORK LEVELS AT THREE DIVISIONS
OF TODD PACIFIC SHIPYARDS
FY- 1976 -- FY- 1980
(As Percent Of Total TPS Activity)

	FY - 1976		FY - 1977		FY - 1978		FY - 1979		FY - 1980	
	Percent Of Total Jobs	Percent Of Total Sales	Percent Of Total Jobs	Percent Of Total Sales	Percent Of Total Jobs	Percent Of Total Sales	Percent Of Total Jobs	Percent Of Total Sales	Percent Of Total Jobs	Percent Of Total Sales
LOS ANGELES	14.5	23.5	14.5	15.2	21.3	28.3	21.0	9.7	18.3	59.9
SAN FRANCISCO	28.5	49.3	24.1	52.0	14.5	39.4	17.2	50.0	12.4	28.3
SEATTLE	57.0	27.2	61.4	32.8	64.2	32.3	61.8	40.3	69.3	11.8
TOTAL:	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: International Maritime Associates, Inc., Washington, D.C. Basedon data provided by the management of Todd Shipyards Corporation.

Notes: (1) Data reflect FY-1980 activity through the first three quarters only.

(2) Todd-Pacific Is Estimated To Have Maintained 33-47 Percent Share Of The West Coast Market Over The 1968-1977 Period

Exhibits 11-9 through 1l-l1 show the estimated share each yard has had in topside and drydock jobs on the West Coast. These include commercial and government jobs.

In the most recent year for which we have complete data, Todd-Pacific accounted for approximately 31 percent of all topside jobs and 37 percent of drydock jobs performed on the West Coast.

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 9

ESTIMATED MARKET SHARE OF TODD -- LOS ANGELES YARD
BY TYPE OF WORK 1968 -- 1977
(AS A PERCENT OF TOTAL WEST COAST)

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Topside Jobs	19.2	12.4	17.2	21.7	17.7	11.2	8.6	12.1	6.7	6.8
Drydock Jobs	7.9	6.2	8.8	9.3	9.2	11.2	9.1	11.3	9.7	15.1
All Jobs	10.5	7.8	10.4	13.6	12.2	11.2	8.9	11.7	8.6	11.8

Source: International Maritime Associates, Inc., Washington, D.C.
Based on internal IMA files.

(3) There Are Significant Differences In Tine Composition Of R&A Work Among The Three Yards

Exhibits 11-12 through 11-14 break down the business activity at each of the three yards.

Todd-Los Angeles has the greatest percentage of foreign-flag work. This percentage has been decreasing. Todd-Seattle stands out by the relatively small percentage of government R&A work that it performs. Todd-San Francisco and Todd-Los Angeles receive 12.4 percent and 7.7 percent respectively from government jobs. Foreign flag work at Todd-San Francisco has been increasing.

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 12

BUSINESS ACTIVITY AT TODD -- LOS ANGELES
BY SOURCE OF WORK
FY-1976 -- FY-1980

Fiscal Year	U.S. Government		U.S. Private		Foreign Flag	
	No. Jobs	% Of Total	No. Jobs	% Of Total	No. Jobs	% Of Total
1976	9	8.0	46	40.7	58	51.3
1977	4	3.7	41	38.0	63	58.3
1978	10	5.7	93	53.2	72	41.1
1979	13	8.3	69	43.9	75	47.8
1980 1/	13	15.5	37	44.0	34	40.5
FIVE YEAR TOTALS:	49	7.7	286	44.9	302	47.4

Source: International Maritime Associates, Inc., Washington, D.C. Based on data provided by the management of Todd Shipyards Corporation.

Notes: (1) Data reflect FY-1980 activity through the first three quarters only.

3. EACH YARD OPERATES WITHIN A DIFFERENT COMPETITIVE FRAMEWORK

Exhibit 11-15 lists the major ship repair yards on the U.S. West Coast. Summed up by Todd yard location, the number of competitors is:

	Drydock Yards	Topside Yards
Los Angeles	3	5
San Francisco	5	8
Seattle	4	4

Beyond these U.S. competitors, there is competition from Canadian shipyards in Vancouver and the obvious choice facing each shipowner to repair oversees.

Apparent heavy competition is provided by competing yards in San Francisco. Management indicates Triple A, with 6 graving docks at Hunters Point, has had significant eroding effect on business at Todd-San Francisco.

The degree of competition tends to be limited in Seattle, except that the new drydock being added to the Burrard yard in Vancouver may present a drawing away factor in the future. This may offset any long term advantages gained by the temporary vessel entrance problems in the Columbia River -- and resulting diversion of business from Portland.

NASSCO has been considering a new drydock, which could add competition to Todd-Los Angeles. Otherwise, Todd-Los Angeles appears to have significant control over its local market.

MAJOR WEST COAST REPAIR FACILITIES BY TYPE OF YARD

MAJOR TOPSIDE YARDS 1/

Cavenaugh Machine Works,.Wilmington, CA.

Coastal Marine Engineering Co., San Francisco, CA.

Colberg, Inc., Stockton, CA.

Dockside Machine & Ship Repair, Wilmington, CA.

Duwamish Shipyard, Inc., Seattle, WA.

Electro-Mechanical Co., Portland, OR.

Ets-Hokin & Galvan Electric Co., San Diego, CA.

Franklin Machine Works, Inc., San Francisco, CA.

Fulton Shipyard, Antioch, CA.

General Engineering & Machine Works, San Francisco, CA.

Golten Marine Co., Inc., Wilmington, CA.

Kettenburg Marine, San Diego, CA.

Marine Iron Works, Shipyard Division, Tacoma, WA.

Marine Ways Corporation, Portland, OR.

Pacific Dry Dock & Repair Co., Oakland, CA.

Pacific Marine & Supply Co., Honolulu, Hawaii

Rowe Machine Works, Inc., Seattle, WA.

Service Engineering Co., San Francisco, CA.

Southwest Marine, Inc., San Diego, CA.

Tacoma Boatbuilding Co., Inc., Tacoma, WA.

Triple "A" South, San Diego, CA.

West Winds, Inc., San Francisco, CA.

Wilmington Iron Works, Wilmington, CA.

Wilmington Welding & Boiler Works, Wilmington, CA.

MAJOR DRYDOCKING YARDS 2/

Bethlehem Steel Corp., San Francisco, CA.

Bethlehem Steel Corp., San Pedro, CA.

California SB & DD Co., Long Beach, CA.

Campbell Industries, San Diego, CA.

Dillingham Marine & Mfg. Co., Portland, OR.

FMC Corp., Portland, OR.

Lake Union Drydock Co., Seattle, WA.

Lockheed SB & Construction Co., Seattle, WA.

Marine Power & Equipment Co., Seattle, WA.

Merritt Ship Repair Co., Oakland, CA.

National Steel & SB Co., San Diego, CA.

Northwest Marine Iron Works, Portland, OR.

Swan Island Ship Repair Yard, Portland, OR.

Southwest Marine, Inc., San Diego, CA.

Southwest Marine Of San Francisco, San Francisco, CA.

Todd Pacific Shipyards, Los Angeles, CA.

Todd Pacific Shipyards, San Francisco, CA.

Todd Pacific Shipyards, Seattle, WA.

Triple "A" Machine Shop, San Francisco, CA.

Triple "A" South, San Diego, CA.

Willamette Iron & Steel Co., Portland, OR.

Source: U.S. Department Of Commerce, Maritime Admimistation, Report On Survey Of U.S. Shipbuilding And Repair Facilities -1979.

Notes: (1) Major topside repair facilities are those that have the capability to provide repair service to oceangoing ships when the work can be accomplished without taking the ships out of the water.
(2) Major drydocking facilities are defined as those yards engaging primarily in repair, overhaul, or construction and having at least one drydock that can accommodate vessels 300 feet in length or over.

(1) Longer Term Developments Seem To Favor The Competitive Position Of Commercial Work In West Coast Yards

As shown in Exhibit 11-16, the differential between U.S. and foreign labor cost has been decreasing. Particularly interesting is that Japan has come within 25 percent of U.S. labor cost as of 1978. For a labor intensive industry such as ship repair, favorable changes in relative labor costs can impact a yard's competitiveness.

Systematic repair yard labor cost data for Canada are not available, but it is understood that labor cost in Vancouver is S1 .00 per hour higher than in Seattle.

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 16

LABOU COST TRENDS: UNITED STATES VERSUS SELECTED REPAIR CENTERS WORLDWIDE
1975 -- 1978

[Estimated Compensation Index -- United States = 100]

Country	1975	1976	1977	1978
United States	100	100	100	100
Canada	NA	NA	NA	NA
France	74	74	8o	88
Japan	56	57	63	75
Netherlands	101	98	105	115
Norway	107	107	113	113
Spain	NA	NA	NA	NA
Sweden	115	119	120	117
West Germany	101	99	109	124

Source: Shipbuilder's Council Of America, Washington, D.C. Based on data prepared by the U.S. Department Of Labor, Bureau Of Labor Statistics, Office Of Productivity and Technology, Division Of Foreign Labor Statistics and Trade.

Exchange rate changes predicted for the future should also favor U.S. ship repair firms. As shown in Exhibit 11-17, the Yen

relative to the dollar has risen from 219 to 251 between May 1979 and Apri1 1980. Most forecasted predict that the Yen will fall to 200-230 by next Apri1.*

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 17

EXCHANGE RATE TRENDS AMONG
MAJOR REPAIR CENTERS WORLDWIDE
AS AGAINST THE U.S. DOLLAR
(Number of Units To U.S. 5)

		Yen	D-Mark	Singapore $	Portugal Es	U.K. £
MAY	1979	219.30	1.90	2.20	49.50	.49
JUNE	"	218.82	1.87	2.17	49.50	.47
JULY	"	217.39	1.84	2.18	49.02	.45
AUG	"	218.82	1.83	2.17	49.26	.36
SEPT	"	221.73	1.78	2.15	49.26	.45
off	"	230.41	1.77	2.16	49.75	.47
NOV	"	243.90	1.77	2.18	50.25	.47
DEC	"	244.50	1.76	2.16	49.75	.45
JAN	1980	236.41	1.72	2.15	49.75	.44
FEB	"	242.13	1.74	2.15	47.39	.43
MAR	"	247.52	1.87	2.22	50.00	.46
APR	"	250.63	1.84	2.24	50.51	.46

Source: International Maritime Associates, Inc., Washington, D.C. Based on data from Lloyd's Shipping Economist, May 1980.

* See Business Week, "Right on the Money Forecasting," June 2, 1980, p. 79.

(2) Todd-Los Angeles Stands To Gain From Anticipated Navy Homeport Policy

According to Todd management, Navy plans to homeport 37 ships in Los Angeles. Among these will be 18 FFG's, 8 DD963's, and 2 LPD's. Since homeport has a major influence on choice of yard, a solid repair market base will be provided to repair yards located in Los Angeles.

4. PROPENSITY TO REPAIR IS SLIGHTLY HIGHER IN THE LOS ANGELES AND SEATTLE MARKETS

An estimate has been made of the propensity to repair ships in each of Todd's West Coast locations.

The procedure is essentially a probability analysis. Vessels entering each of the three harbors are broken down by flag of registry and last port of call. There are four groups according to flag of registry, and two groups according to last port of call.

Vessels in U.S. registry coming from a port having no repair yard have the highest propensity to repair in a U.S. yard. Ships in registries typically reluctant to repair outside their own country (such as Soviet bloc countries), coming to a U.S. port from a port having a repair yard, have the least probability to repair in the U.S.

Using a special computerized program, we have calculated the average propensity to repair for ships arriving in each of the three ports. The data are shown in Exhibits 11-18 through 11-20.

The data indicate little difference between the three locations. San Francisco is Slightly lower than the other two locations.

There is cirtually no change in propensity to repair over the period. (Note: 1974 data have not been included in arriving at this conclusion as the basis for tabulating the raw data in 1974 on the West Coast is different than for subsequent years.)

ANALYSIS OF VESSEL TRAFFIC AT
THE PORT OF LOS ANGELES/LONG BEACH
BY PROPENSITY TO REPAIR
1974 — 1978

Category Of Registry	Entrances From Countries Possessing Repair Base		Entrances From Countries Lacking Repair Base	
	Year	Estimated Number Of Repair Opportunities	Year	Estimated Number Of Repair Opportunities
A (.80/1.0)	1978	748 * .80 = 598	1978	467 * 1.0 = 467
	1977	787 * .80 = 630	1977	499 * 1.0 = 499
	1976	543 * .80 = 434	1976	202 * 1.0 = 202
	1975	831 * .80 = 665	1975	627 * 1.0 = 627
	1974	323 * .80 = 258	1974	186 * 1.0 = 186
B (.60/.80)	1978	4,774 * .60 = 2,864	1978	1,426 * .80 = 1,141
	1977	4,103 * .60 = 2,462	1977	1,410 * .80 = 1,128
	1976	1,772 * .60 = 1,063	1976	702 * .80 = 562
	1975	3,364 * .60 = 2,018	1975	1,521 * .80 = 1,217
	1974	1,484 * .60 = 890	1974	660 * .80 = 528
C (.40/.60)	1978	13 * .40 = 5	1978	35 * .60 = 21
	1977	11 * .40 = 4	1977	23 * .60 = 14
	1976	12 * .40 = 5	1976	13 * .60 = 8
	1975	27 * .40 = 11	1975	48 * .60 = 29
	1974	22 * .40 = 9	1974	27 * .60 = 16
D (.20/.40)	1978	764 * .20 = 153	1978	231 * .40 = 92
	1977	630 * .20 = 126	1977	248 * .40 = 99
	1976	288 * .20 = 58	1976	131 * .40 = 52
	1975	644 * .20 = 129	1975	239 * .40 = 96
	1974	3,085 * .20 = 617	1974	1,566 * .40 = 626

Summary Of Propensity Indices

1978 A= 1,065
B= 4,005
C= 26
D= 245
5,341

5,341 / 8,458 = .63

1977 A= 1,129
B= 3,590
C= 18
D= 225
4,962

4,962 / 7,711 = .64

1976 A= 456
B= 1,625
C= 13
D= 110
2,204

2,204 / 3,474 = .63

1975 A= 1,292
B= 3,235
C= 40
D= 225
4,792

4,792 / 7,301 = .66

1974 A= 444
B= 1,418
C= 25
D= 1,243
3,130

3,130 / 7,353 = .43

Source: International Maritime Associates, Inc., Washington, D.C.
Based on data provided by the U.S. Department Of Commerce, Maritime Administration, Office Of Trade Studies And Statistics, Division Of Economic Analysis.

5. TODD-PACIFIC COMMERCIAL R&A SALES PROSPECTS ARE PROJECTED TO GROW 21 PERCENT BETWEEN 1981-1990

Without taking into account the proposed changes at Todd-Los Angeles and Todd-Seattle, we have projected the market for commercial R&A work at each of the Todd West Coast facilities. This is essentially a sales projection under "do nothing" conditions -- given the underlying economic factors that drive ship repair demand. It assumes that capacity will be available as demand dictates.

(1) Underlying Econoimic Factors Will Grow Significantly On The West Coast Over The Next Decade

Exhibits 11-21 through 11-23 show the projected trends in manufacturing output, population and personal income for the states of Washington, Oregon and California.

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 21

TOTAL DOLLAR VALUE OF MANUFACTRING
OUTPUT 1970 — 2000: AGGREGATE
U.S. VERSUS THE WEST COAST
IN BILLIONS OF CONSTANT DOLLARS 1/

CALENDAR YEAR	U.S. OUTPUT	WEST COAST OUTPUT
1970	301.5	34.6
1975	305.1	35.9
1980	416.9	47.1
1985	478.8	53.8
1990	529.9	60.4
2000	670.8	74.2

Source: U.S. Department Of Commerce, Bureau Of Economic Analysis, Regional Economic Analysis Division. Interim Report, May 1980.
Notes: (1) Dollar amounts stated in billions of constant 1978 dollars.
(2) West Coast states: Washington, Oregon, and California.

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 22

POPULATION TRENDS 1970 -- 2000
TOTAL U.S. VERSUS WEST COAST 1/
(millions)

CALENDAR YEAR	U.S. POPULATION	WEST COAST POPULATION
1970	203.8	25.5
1975	213.0	27.0
1980	221.6	28.5
1985	232.2	30.0
1990	242.9	31.4
2000	259.8	33.6

Source: U.S. Department Of Commerce, Bureau Of Economic Analysis, Regional Economic Analysis Division. Interim Report, May 1980.
Note: (1) Inclusive of: Washington, Oregon, and California.

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 23

TOTAL DOLLAR VALUE OF DISPOSABLE PERSONAL INCOME (DPI)
1970 -- 2000: AGGREGATE U.S. VERSUS
THE WEST COAST
IN BILLIONS OF CONSTANT DOLLARS 1/

CALENDAR YEAR	U.S. DPI	WEST COAST DPI
1970	1,376.7	190.0
1975	1,579.2	219.4
1980	2,098.5	284.1
1985	2,523.4	338.4
1990	2,975.1	394.1
2000	4,063.1	526.9

Source: U.S. Department Of Commerce, Bureau Of Economic Analysis, Regional Economic Analysis Division. Interim Report, May 1980.
Notes: (1) Dollar amounts stated in billions of constant 1978 dollars.
(2) West Coast states: Washington, Oregon, and California.

Significantly, manufacturing output in these states is projected to grow from $47 billion to $74 billion between 1980-2000. This is an average annual real growth of 2.2 percent.

(2) Projected Ship Arrivals For Each Of The Three Ports Form The Basis For Estimating Future R&A Sales From Commercial Work

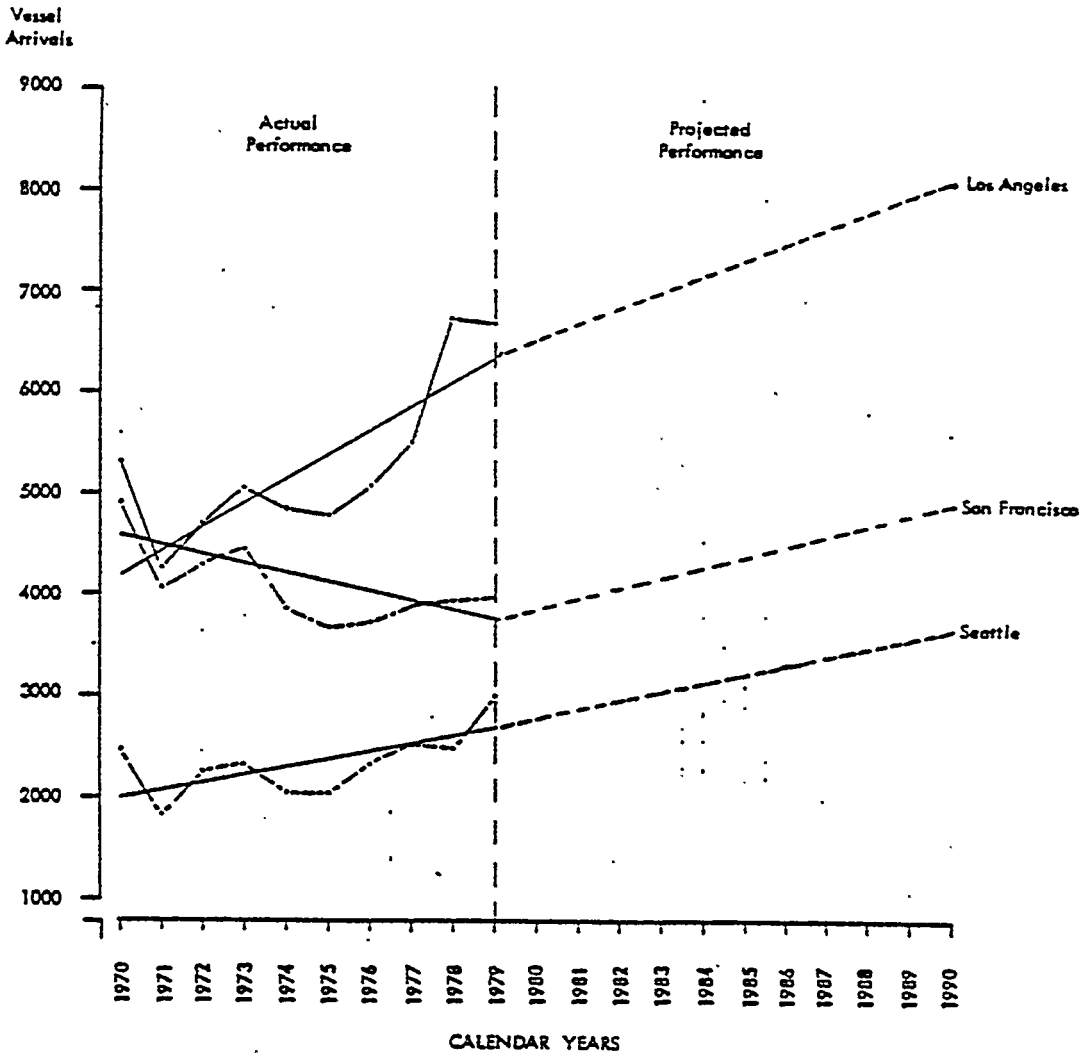
Between 1968 and 1977, cargo throughput grew at an average annual rate of 5.13 percent at Los Angeles, 1.30 percent at San Francisco, and 1.53 percent at Seattle. On the basis of these historical rates of growth, it is anticipated that future ship arrivals at the three ports will grow at a rate equal to or greater than the annual growth of cargo throughput. This assumption takes account of the fact that future levels of throughput are likely to rise, while vessel sizes remain relatively constant, and slower voyage speeds become more common in an effort to maximize fuel economy.

Shown in Exhibit 11-24 are the actual commercial ship arrivals in each of the three ports over the period 1970-1979. A least-squares line is fitted to these data, as shown. The least-squares line is then projected into the future based on the projected growth rate of manufacturing output for either California or Washington, depending on the yard's location.

The dotted line out through 1990 is our projection of ship arrivals.

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 24

COMMERCIAL VESSEL ARRIVALS
AT THREE WEST COAST PORTS
1970 — 1990



Source: International Maritime Associates, Inc., Washington, D.C. June 1980.
Based on historical data provided by Todd Shipyards Corporation.

Exhibits 11-25 through 11-27 break down the projected vessel arrivals by type of vessel.

Todd Pacific Shipyards
Market And Economic Study
Exhibit II. 25

PROJECTED COMMERCIAL FLEET COMPOSITION
AT THE PORT OF LOS ANGELEs
BY TYPE OF VESSEL
1981, 1985, 1990

TYPE OF VESSEL	PROJECTED COMMERCIAL VESSEL ARRIVALS		
	1981	1985	1990
General Cargo	4,277	4,418	4,671
Container Ships	309	444	590
LASH	58	96	123
Neo-bulk Carriers	400	592	782
Dry Bulk Ships	778	903	1,056
Combination Carriers	40	44	42
Tankers	533	562	567
TOTAL PROJECTED ARRIVALS	6,495	7,059	7,831

Source: International Maritime Associates, Inc., Washington, D.C. Projected fleet composition based on MERCHANT FLEET FORECAST OF VESSELS IN U.S. FOREIGN TRADE, U.S. Maritime Administration, Office Of Commercial Development. April, 1978.

PROJECTED BEAM DISTRIBUTION OF VESSELS
ENGAGED IN U. S. FOREIGN TRSDES
- U. S. WEST COAST -
1990

Beam	Number Of Vessels	Percent Of Total
35' - 60'	547	26.9
61' - 70'	26	1.3
71' - 80'	1,043	51.3
81' - 90'	206	10.1
91' - 100'	56	2.8
100' +	154	7.6
	2,032	100.0

-- WEST COAST TRADES --
PROJECTED PERCENT DISTRIBUTION
OF VESSEL TYPES BY
DISPLACEMENT TONNAGE
1990

TYPE OF VESSEL	UP TO 10,000	10,001 - 20,000	20,001 - 40,000	40,001 - 60,000	60,001 - 80,000	OVER 80,000
GENERAL CARGO	39.2	47.0	13.8	—	—	—
CONTAINER SHIPS	4.6	48.4	45.1	1.9	—	—
LASH	—	—	96.9	3.1	—	—
NEO-BULK CARRIERS	12.8	19.2	63.0		5.0	—
DRY BULKERS	13.9	27.0	50.0	6.9	2.2	
COMBINATION CARRIERS	—	—	—		81.8	18.2
TANKERS	18.4	6.1	34.0	8.8	19.1	13.6

Source: International Maritime Associates, Inc. Based on MERCHANT FLEET FORECAST OF VESSELS IN U.S. FOREIGN TRADE, U.S. Maritime Administration, Office Of Commercial Development. April 1978.

Exhibit 11.29 shows the expected draft distribution of vessels likely to be employed on the West Coast by 1990.

Todd Pacific shipyards
Market And Economic Study
Exhibit 11.29

PROJECTED DRAFT DISTRIBUTION OF VESSELS
ENGAGED IN U. S. FOREIGN TRADES
-- U. S. WEST COAST -
1990

Draft	Number Of Vessels	Percent of Total
15' - 25'	547	26.9
26' - 30'	450	22.1
31' - 35'	751	37.0
36' - 40'	175	8.6
41' +	109	5.4
	2,032	100.0

Source: International Maritime Associates, Inc. Based on MERCHANT FLEET FORECAST OF VESSELS IN U. S. FOREIGN TRADE, U. S. Maritime Administration, Office Of Commercial Development. April, 1978.

Exhibit 11.30 shows the expected distribution of vessels by light ship weight.

Todd Pacific Shipyards
Market And Economic Study
Exhibit 11.30

PROJECTED LIGHT SHIP WEIGHT DISTRIBUTION OF VESSELS
ENGAGED IN U. S. FOREIGN TRADES
— WEST COAST —
1990

Type of Ship	Estimated Average Light Ship Weight	Number Of Vessels	Percent of Total
General Cargo	9,100	1,212	59.6
Container Ships	11,574	153	7.5
LASH	15,211	32	1.6
Neo-Bulk	8,200	203	10.0
Dry Bulk	6,254	274	13.5
Combination Carriers	20,892	11	.5
Tanker	12,356	147	7.3
TOTAL	22,441	2,032	100.0

Source: International Maritime Associates, Inc. Based on MERCHANT FLEET FORECAST OF VESSELS IN U. S. FOREIGN TRADE, U. S. Maritime Administration, Office Of Commercial Development. April, 1978.

6. NAVAL OVERHAUL WORK ON THE WEST COAST IS EXPECTED TO BE SUBSTANTIAL, AND THE THREE TODD YARDS SHOULD BENEFIT -- BUT NOT EQUALLY

Over the next ten years, Todd-Pacific will have significant opportunities to attract Navy overhaul work. Todd-Los Angeles has the greatest opportunity, particularly if a life cycle ship rnaintenance contract can be negotiated with the Navy.

(1) NAVSEA'S Current Three Year Overhaul Schedule Calls For Between 11 and 19 Vessels To Be Overhauled At Yards In Los Angeles, San Francisco, and Seattle

The most recent NAVSEA three-year ship overhaul schedule has been examined. The following three exhibits are based on these schedule data.

Exhibit 11.31 shows that eleven naval ships will be overhauled at Los Angeles between FY-1980 and FY-1982.

Todd pacific Shipyards
Market And Economic Study
Exhibit 11.31

PLANNED NAVAL OVERHAUL WORK
LOS ANGELES REPAIR MARKET
FY-1980 - FY-1982

	cLAss	THREE YEAR TOTAL
ACTIVE FLEET		
	AD-14	1
	FF-1037	1
	LPD-4	2
	LSD-36	1
	LST-1179	1
RESERVE FLEET		
	AFT-096	1
	MSO-422	2
CARRY OVERS		
	FF-1040	1
	LST-1179	1

TOTALS:

ACTIVE	6
RESERVE	3
CARRY OVERS	2
GRAND TOTALS:	11

Source: Department Of The Navy, Washington, D.C.

(2) Home Port Policy Has A Major impact On Future Navy Overhaul Opportunities

There are eleven designated home ports on the U. S. West Coast. Geographically, they are grouped so closely around four cities that, as a practical matter, there are on!y four major West Coast home ports - San Diego, Long Beach, San Francisco and Seattle.

As a general rule, ships of the U. S. active fleet are repaired near their home ports so ihat crew dislocation and other in-port expenses are minimized. Of the 137 active ships in the Pacific Fleet projected to be overhauled over the next seven years, 106 are home ported in San Diego. This impacts the potential Navy work in other Pacific l0ocations.

Exhibit 11-34 shows a longer term breakdown of Pacific Fleet ships scheduled for repair in public and private yards through FY-1986.

Todd Pacific Shipyards
Market And Economic Study
Exhibit 11.34

PACIFIC FLEET SHIPS SCHEDULED FOR REPAIR IN
PUBLIC AND PRIVATE YARDS THROUGH FY-86
BY HOME PORT

	san Diego	Long Beach	San Francisco	Seattle
Active Fleet	106	8	15	8
Reserve Fleet	6	4	3	3
Restricted Availability	44	7	4	4
Post Shakedown Availability	8	5	1	0

Of the projected 137 repairs Of active fleet ships, 81 could — in our opinian -- be carried out in private yards. in almost every case where preliminary repair locations have already been assigned, Seattle, San Francisco and Long Beach home port ships are scheduled for repair within their own region (amounting to 14 ships). In the case of home part San Diego, 12 ships have been scheduled with Supship San Diego, 25 in the other three areas. This results in the following distribution

of scheduled repairs over the next three years:

	Distribution of Scheduled Repairs	Average Per Year FY-82 - FY-84
San Diego	12	4
Long Beach	12	4
San Francisco	17	5
Seattle	16	5

Although the distribution of repairs is not uniform, it also is not skewed heaviIy toward the major home port, San Diego, as might be expected by reason of the home port ship numbers presented in Exhibit 11.34.

(3) Navy Ship Overhaul And Maintenance Should Provide An Attractive Future Market For Todd's Los Angeles Yard

Beyond home port policy, which is generally an indicator of future trends, maintenance of certain classes of ships is now almost totally allocated to private yards. The FF1052's and certain DD's are recent examples of this trend. Shipbuilding practice for the DD963 and FFG's now includes scheduling of Post Shakedown Availabilities (PSA's) and some backfitting of combat systems in the building yards rather than in public yards.

The practice of schecduling after sales repairs in builder yards could bring Todd-Los Angeles over $685 million in Syncorlift revenues between 1985 and 1994. A breakdown of these projected revenues -- based on life cycle servicing of the 18 FFG's to be home ported in Los Angeles — is presented in Exhibit 11.35.

It should be noted that in Exhibit 11.35 it is assumed that the 13 FFG's awarded to Todd-LA, plus 5 contemplated additional awards, are the basis for the life cycle schedule. If other FFG's are home ported in Los Angeles, the schedule would be similar -- but the timing of PSA'S and other work would vary depending on the ship's delivery date.

Todd-Seattle and Todd-San Francisco do not appear to have the same opportunity for life cycle repair work. Todd-Seattle will not be a home port for FFG's, and there is competition from other yards in SupShip Seattle. Todd-San Francisco faces severe competition for Navy work, and SupShip San Francisco has -- according to Todd management - exercised, to the detrement of Todd-San Francisco, a policy of split bidding.

It is projected that Todd-Seattle will obtain four active naval ship overhauls every three years over the next decade. Additionally,

ESTIMATED REVENUE POTENTIAL OF LIFE CYCLE REPAIR AND MAINTENANCE WORK ON FFG CLASS SHIPS

LA-Built Ships	Delivery Date	1980 1 2 3 4	1981 1 2 3 4	1982 1 2 3 4	1983 1 2 3 4	1984 1 2 3 4	1985 1 2 3 4	1986 1 2 3 4	1987 1 2 3 4	1988 1 2 3 4	1989 1 2 3 4	1990 1 2 3 4	1991 1 2 3 4	1992 1 2 3 4	1993 1 2 3 4	1994 1 2 3 4
FFG- 9	2-80	△□		▼		▼	▼	▼	▼	▼	▼	O		▼		▼
12	6-80	△□		▼		▼	▼	▼	▼	▼	▼	O		▼		▼
14	10-80	△□		▼	▼	▼	▼	▼	▼	▼	▼	O	O	▼		▼
19	4-81		△□	▼	▼	▼	▼	▼	▼	▼	▼	O	O	▼		▼
23	8-81		△□	▼	▼	▼	▼	▼	▼	▼	▼	O	O	▼		▼
25	1-82			△□	▼	▼	▼	▼	▼	▼	▼	▼	O	▼		▼
27	4-82			△□	▼	▼	▼	▼	▼	▼	▼	▼	O	▼		▼
30	8-82			△□	▼	▼	▼	▼	▼	▼	▼	▼	O	▼		▼
33	1-83				△□	▼	▼	▼	▼	▼	▼	▼	▼	▼	O	▼
38	5-83				△□	▼	▼	▼	▼	▼	▼	▼	▼	▼	O	▼
41	9-83				△	□	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
43	12-83					△□	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
46	6-84					△□	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Subtotal: Ships on order ($millions)		9.7	17.0	22.8	23.3	32.9	22.2	24.6	22.2	24.6	22.2	61.6	77.7	79.3	58.5	80.1
	Estimated Delivery Dates															
	9-84					△	□	▼	▼	▼	▼	▼	▼	▼	▼	▼
	12-84						△□	▼	▼	▼	▼	▼	▼	▼	▼	▼
	6-85						△□	▼	▼	▼	▼	▼	▼	▼	▼	▼
	9-86						△	□	▼	▼	▼	▼	▼	▼	▼	▼
	12-86							△□	▼	▼	▼	▼	▼	▼	▼	▼
Subtotal: Expected acquisitions ($millions)		0	0	0	0	0	14.9	14.6	9.4	8.6	9.4	8.6	10.9	7.8	10.2	7.8
TOTAL ESTIMATED REVENUES -- LA:		9.7	17.0	22.8	23.3	32.9	37.1	39.2	31.6	33.2	31.6	70.2	88.6	87.1	68.7	87.9

Source: International Maritime Associates, Inc., Washington, D.C.

Notes: (1) Revenues stated in constant 1980 dollars.
(2) Assumptions: (a) PSA = Delivery plus six months @2 mo./PSA; (b) SRA = PSA completion plus 2 years @ 1 month per SRA; (c) Todd average daily loaded rate -- LA = $216./SEA = $192; (d) Average man-days/PSA = 21,000; (e) Average man-days/IMA = 3,000; (f) Average man-days/SRA = 7,000; (g) Average man-days/overhaul = 100,000; (h) Average revenue/PSA = LA @$4.5 million -- SEA @ $4.0 million; (i) Average revenue/SRA = LA @$1.5 million -- SEA @$1.3 million; (j) Average revenue/IMA = LA @$ .7 million -- SEA $ .6 million; (k) Average revenue/major overhaul $20.0 million.

Legends: △ = Delivery; □ = PSA (Post Shakedown Availability; ▼ = SRA (Scheduled Restricted Availability); I = IMA (Intermediate Maintenance Availability; O = Major overhaul

there will be one Coast Guard vessel overhau1 and one naval reserve ship overhaul annually. Todd-San Francisco should have about the same opportunity, though as stated above, there is stiffer competition for available work.

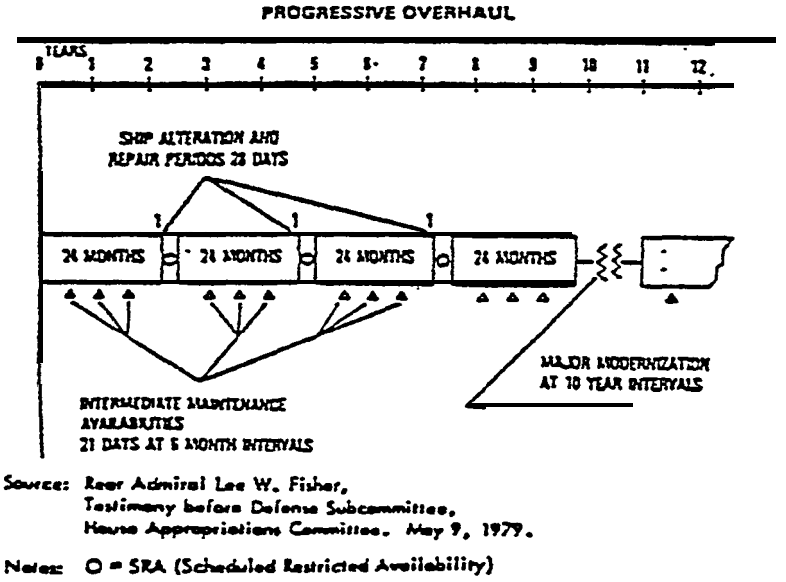
Active naval ship overhauls are expected to produce 500,000 billable man-hours of work per year, while other govemment work is expected to generate an additional 40,000 man-hours each year. This work should produce about S120 million revenue from active naval ship overhauls and S10 million in other government ship overhauls over a ten year period.

(4) Future Navy Policy On Life Cycle Contracts Will Impact The Potential Naval Ship Revenues At Las Angeles

The extended operating cycle of the FFG's is based on a major overhau1 every ten years and scheduled restricted availabilities every two years. Exhibit 11.36 illustraes the FFG-7 class operating life cycle. To date, the Navy remains undecided as to whether private yards possess the capability to successfully complete SRA'S. Since during construction shipyards instal1 combat systems as a unit, it is

Todd Pacific Shipyards
Market And Economic Study
Exhibit 11.36

FFG-7 CLASS OPERATINGH CYCLES



Source: Rear Admiral Lee W. Fisher,
Testimony before Defense Subcommittee,
House Appropriations Committee. May 9, 1979.

Notes: O = SRA (Scheduled Restricted Availability)

generally believed within the Navy that private yards have only limited capability to perform required SRA work. Thus, current practices 1imit servicing at builder yards to PSA'S and retrofittings.

Should this restrictive practice remain unchanged, FFG-related revenues could be severely limited. There is little reason to doubt that combat systems repair can be performed by subcontractors under the supervision of the building yard. The indecision on the part of the Navy concerning future life cycle support policy may have more to do with the public/private yard budget split than the inherent capability of the yards to perform. Far this reason, private yard initiative in going after this SRA business may ultimately be the pivotal factor in determining future policy.

The benefit to Todd of gaining life cycle repair contracts for the FFG's built on the West Coast was clearly illustrated in Exhibit !1.35. Gaining the relatively routine IMA's alone would add $186 million to the Los Angeles yard's revenue potential 1985-1994.

III. FINANCING EVALUATION

III. FINANCIAL ANALYSES

This chapter examines the financial impact of proposed yard improvements at Los Angeles and Seattle.

- Todd-Los Angeles proposes the acquisition of a two berth Syncrolift;
- Todd-Seattle the acquisition of a large replacement drydock.

The financial feasibility of the proposed facility upgrades are discussed below.

1. A TWO BERTH SYNCROLIFT AT TODD-LOS ANGELES, ASSUMING A LIFE CYCLE FFG MAINTENANCE CONTRACT, WILL PRODUCE SIGNIFICANT RETURN ON INVESTMENT

Evacuation of proposed improvements to the Los Angeles yard shows a Syncrolift to be well-suited to the demands of Navy market on the West Coast.

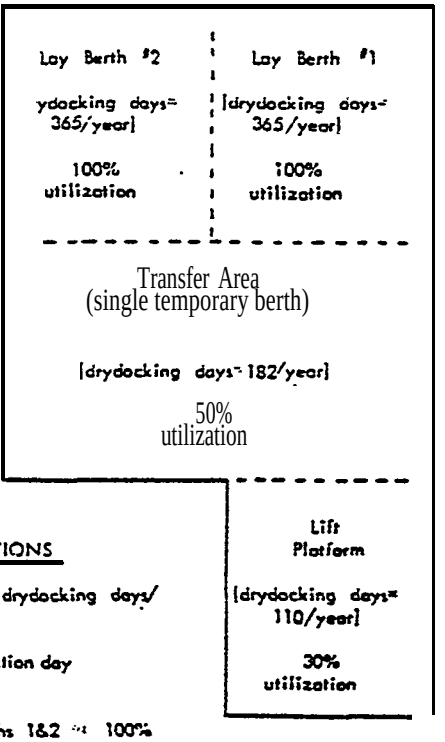
(1) The Key Factor Underlying A Positive Financial Picture will Be Todd's Capability To Obtain Long Term Navy Work

The financial viability of a two berth Syncrolift will depend heavily on a steady flow of Navy work. In particular, its profitability will be tied to life cycle repairs on FFG class ships.

Exhibit III.1, below, is a schematic illustration of the proposed facility. This exhibit shows that under normal circumstances

Todd Pacific Shipyards
Market And Economic Study
Exhibit 111.1

PROPOSED SYNCROLIFT



ASSUMPTIONS

(1) Total available drydocking days/ year= 1,022

(2) One shift/production day

(3) Occupancy:
  (a) Lay berths 1&2 = 100% Naval;
  (b) Transfer Area temporary berth = 50%, intermediate-term work, both Naval and commercial;
  (c) Lift Platform temporary berth = 30%, fast turn-around work, mainly commercial

(4) Duration of naval work:
  (a) Overhauls=365 days;
  (b) PSA's =60 days;
  (c) SRA's =28-30 days;
  (d) IMA's =15 days

Source: International Maritime Associates, Inc. Washington, D.C.

Syncrolift capacity will be abcot 1,022 drydocking days per year. The facility will be capable of handling up to 24 SRA's (or two overhauls) per year, while at the same time providing sufficient capacity to engage in faster turnaround naval and commercial jobs. If is possible to increase the facility's use by second shift operation, or doubling the number of FFG's put on each berth.

Exhibit 111.2, on the following page, shows the level of projected revenues attributable to life cycle maintenance on FFG ships. Over the period 1985 to 1994, the relevant financial window, a life cycle contract could produce average annual revenues exceeding $65 million. This exhibit emphasizes the importance of a long range Navy commitment to Todd, in order to assure the financial success of the proposed investment.

(2) Three Pro Forma Financial Statements Have Been Prepared With Varying Assumptions About Project Financing

The financiaI performance of the proposed capital improvement hinges on financing options available to Todd. Three options have been considered:

- Municipal Bond Issue (base condition) - over 30 years @ 9.2%, where Todd would lease the Syncrolift from the City of Los Angeles;

ESTIMATED REVENUE POTENTIAL OF LIFE CYCLE REPAIR AND MAINTENANCE WORK NAVY MARKET

LOS ANGELES

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
											LOS ANGELES PROJECTION WINDOW				
OVERHAULS @ 20.0m											40.0	60.0	60.0	40.0	60.0
PSA @ 4.5m	9.0	13.5	13.5	9.0	13.5	0	0	0	0	0	0	0	0	0	0
PSA *						13.5	9.0								
SRA @ 1.5m	0	0	3.0	4.5	7.5	7.5	12.0	7.5	12.0	7.5	9.0	3.0	6.0	4.5	7.5
SRA *								4.5	3.0	4.5	3.0	6.0	1.5	6.0	1.5
Subtotals:	9.0	13.5	16.5	13.5	21.0	21.0	21.0	12.0	15.0	12.0	52.0	69.0	67.5	50.5	69.0
IMA @ .7m	.7	3.5	6.3	9.8	11.9	14.7	12.6	14.7	12.6	14.7	12.6	14.7	13.3	14.0	12.6
IMA *						1.4	5.6	4.9	5.6	4.9	5.6	4.9	6.3	4.2	6.3
TOTALS:	9.7	17.0	22.8	23.3	32.9	37.1	39.2	31.6	33.2	31.6	70.2	88.6	87.1	68.7	87.9
Other NAVY:	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
GRAND TOTALS:						48.1	50.2	42.6	44.2	42.6	81.2	99.6	98.1	79.7	98.9

Source: International Maritime Associates, Inc., Washington, D.C.

Notes: * = Estimated based on expected FFG orders for Fiscal Years 1981--1985.

- Equipment Financing — over 7 years @ 14%, where 80% of initial project cost wil1 be vendor financed, and Todd will supply 20% equity;

- Conventional Bond Issue -- over 10 years @ 13.25%, on 100% of initial project cost.

Commercial sales of $6.2 million annually between 1985 and 1994 are projected. Naval sales vary in each year and are tied to figures projected in Exhibit III.2. Profit margins are assumed to be 30 percent on commercial work as against 5 percent margin on Navy jobs.

Syncrolift margin is calculated by projecting lift revenues and direct/indirect lift operating casts. Estimated direct and overhead Syncrolift expenses have been provided by Todd management, while debt and equity recovery expenses have been calculated by IMA. Syncrolift costs are then added to reflect the CPFF nature of Navy contracts. That portion of costs not billable to Navy account is calculated based on commercial sales as a percent of total sales. The residual expenses are applied against Syncrolift revenues to calculate projected Syncrolift margin.

Exhibits III.3 through III.5 show the three financial pro formas. Each pro forma shows substantial, positive, contribution to yard incremental net income throughout the first ten years of operation.

TODD PACIFIC SHIPYARDS
LOS ANGELES
PRO FORMA STATEMENT OF INCOME FLOWS ATTRIBUTABLE TO PROPOSED SYNCROLIFT

	FY-1985	FY-1986	FY-1987	FY-1988	FY-1989	FY-1990	FY-1991	FY-1992	FY-1993	FY-1994
1. PROJECTED YARD SALES ATTRIBUTABLE TO NEW SYNCROLIFT:	52,500	54,600	47,000	48,600	47,000	83,600	104,000	102,500	84,100	103,300
(a) [Navy Work]	48,100	50,200	42,600	44,200	42,600	81,200	99,600	98,100	79,700	98,900
(b) [Commercial]	4,400	4,400	4,400	4,400	4,400	4,400	4,400	4,400	4,400	4,400
2. PROJECTED INCREMENT TO YARD GROSS MARGIN EXCLUSIVE OF SYNCROLIFT MARGIN: [Navy Work @ 3%/job] [Commercial Work @ 30%/job]	3,725	3,830	3,450	3,530	3,450	5,340	6,300	6,225	* 5,305	6,265
3. PROJECTED SYNCROLIFT SALES -- COMMERCIAL: [Average Revenue/Job = $63,920]	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
4. ESTIMATED SYNCROLIFT COSTS:										
• Direct	141	141	141	141	141	141	141	141	141	141
• Overhead	423	423	423	423	423	423	423	423	423	423
• Municipal Lease	1,626	1,626	1,626	1,626	1,626	1,626	1,626	1,626	1,626	1,626
• Equity Recovery	1,316	1,316	1,316	1,316	1,316	0	0	0	0	0
5. TOTAL ESTIMATED SYNCROLIFT COSTS:	3,906	3,906	3,906	3,906	3,906	2,390	2,390	2,390	2,390	2,390
6. ESTIMATED SYNCROLIFT COSTS NOT COVERED BY NAVY CONTRACTS: [(Line 1.b ÷ Line 1) ÷ Line 2] * Line 5	446	429	496	480	496	149	140	143	173	141
7. PROJECTED SYNCROLIFT MARGIN: [Line 3 - Line 6]	1,154	1,171	1,104	1,120	1,104	1,451	1,460	1,456	1,427	1,459
8. INCREMENTAL NET INCOME ATTRIBUTABLE TO NEW SYNCROLIFT: [Line 2 + Line 7]	5,079	5,201	4,754	4,850	4,754	7,011	7,960	7,883	6,932	7,924
9. CUMULATIVE INCREMENTAL NET WORTH:	5,079	10,280	15,034	19,884	24,638	31,649	39,609	47,492	54,424	62,348

COST/REVENUE ANALYSIS AND ASSUMPTIONS

TYPE OF FACILITY: SYNCROLIFT

	($ Constant 1984)
INVESTMENT COST:	$21.0 million
TYPE OF FINANCING & TERMS:	
• Equity @18% over 5 yrs.	$ 4.74 million
• Municipal Bond Issue @9.3% over 30 yrs.	$16.26 million
-- Capital recovery factor on equity	.319778
-- Capital recovery factor on bond issue	.099885

ANNUAL PAYMENTS:

Equity	Bond	Total
4.74	16.26	21.0
* .319778	* .099885	
1.515747	1.624130	3.139877

TODD PACIFIC SHIPYARDS
LOS ANGELES
PRO FORMA STATEMENT OF INCOME FLOWS ATTRIBUTABLE TO PROPOSED SYNCROLIFT

	FY-1983	FY-1984	FY-1985	FY-1986	FY-1987	FY-1988	FY-1989	FY-1990	FY-1991	FY-1992
PROJECTED YARD SALES ATTRIBUTABLE TO NEW SYNCROLIFT:										
(a) [Navy Work]	53,200	56,600	47,000	49,600	47,000	83,600	104,000	103,500	84,100	103,300
(b) [Commercial]	48,100	50,200	42,600	44,200	43,600	81,200	99,600	98,100	79,700	98,900
	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600
PROJECTED INCREMENT TO YARD GROSS MARGIN EXCLUSIVE OF SYNCROLIFT MARGIN:										
[Navy Work @ 5%/(a)]	2,728	2,830	2,450	2,530	2,450	5,280	6,300	6,225	5,355	6,245
[Commercial Work @ 30%/(a)]										
PROJECTED SYNCROLIFT SALES -- COMMERCIAL: (Average Revenue/dd = $40,920)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
ESTIMATED SYNCROLIFT COSTS:										
• Direct	141	141	141	141	141	141	141	141	141	141
• Overhead	625	625	625	625	625	625	625	625	625	625
• Debt Service -- Vendor Financed	3,918	3,918	3,918	3,918	3,918	3,918	3,918	0	0	0
• Equity Recovery	1,343	1,343	1,343	1,343	1,343	0	0	0	0	0
TOTAL ESTIMATED SYNCROLIFT COSTS:	6,027	6,027	6,027	6,027	6,027	4,684	4,684	766	766	766
ESTIMATED SYNCROLIFT COSTS NOT COVERED BY NAVY CONTRACTS: [(Line 1.b ÷ Line 3) / (Line 1 ÷ Line 2)] * Line 5	692	662	765	741	765	332	276	45	53	63
PROJECTED SYNCROLIFT MARGIN: (Line 3 - Line 6)	1,108	1,138	1,035	1,059	1,035	4,948	6,324	6,745	5,753	6,753
INCREMENTAL NET INCOME ATTRIBUTABLE TO NEW SYNCROLIFT: (Line 2 + Line 7)	4,833	4,968	4,485	4,589	4,485	6,819	7,826	7,950	7,050	8,020
CUMULATIVE INCREMENTAL NET WORTH:	4,833	9,801	14,286	18,875	23,360	30,209	38,035	46,015	53,065	61,085

COST/REVENUE ANALYSIS AND ASSUMPTIONS

TYPE OF FACILITY: SYNCROLIFT

($ Constant 1980)

INVESTMENT COST: $21.0 million

TYPE OF FINANCING & TERMS:

- Equity @18% opportunity cost of capital on 20% of project cost over 3 yrs.
- Conventional loan @14% on 80% of project cost over seven (7) yrs.
  - -- Capital recovery factor on equity .319778
  - -- Capital recovery factor on loan .233192

ANNUAL PAYMENTS:

Equity	Loan	Total
4.200 m	16.800	$ = $1,343,047.60
*.319778	*.233192	$ = $3,917,625.60
$1,343,047.60	$3,917,625.60	$ = $5,260,673.20

TODD PACIFIC SHIPYARDS
LOS ANGELES
PRO FORMA STATEMENT OF INCOME FLOWS ATTRIBUTABLE TO PROPOSED SYNCROLIFT

	FY-1983	FY-1984	FY-1985	FY-1986	FY-1987	FY-1988	FY-1989	FY-1990	FY-1991	FY-1992
1. PROJECTED YARD SALES ATTRIBUTABLE TO NEW SYNCROLIFT:										
(a) [Navy Work]	$3,200	$4,600	47,000	48,600	47,000	83,600	104,000	102,500	86,100	102,300
(b) [Commercial]	48,100	50,200	42,600	44,200	42,600	81,200	99,600	98,100	79,700	98,600
	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600
2. PROJECTED INCREMENT TO YARD GROSS MARGIN EXCLUSIVE OF SYNCROLIFT MARGIN: [Navy Work @ 5%/job] [Commercial Work @ 30%/job]	3,725	3,830	3,450	3,530	3,450	5,360	6,300	6,225	5,305	6,265
3. PROJECTED SYNCROLIFT SALES -- COMMERCIAL: [Average Revenue/dd = $40,920]	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
4. ESTIMATED SYNCROLIFT COSTS:										
• Direct	141	141	141	141	141	141	141	141	141	141
• Overhead	625	625	625	625	625	625	625	625	625	625
• Debt Service -- Conventional Bond Issue	3,909	3,909	3,909	3,909	3,909	3,909	3,909	3,909	3,909	3,909
5. TOTAL ESTIMATED SYNCROLIFT COSTS:	4,675	4,675	4,675	4,675	4,675	4,675	4,675	4,675	4,675	4,675
6. ESTIMATED SYNCROLIFT COSTS NOT COVERED BY NAVY CONTRACTS: [(Line 1.b + Line 3) / (Line 1 + Line 3) * Line 5]	537	514	394	575	394	331	274	278	338	276
7. PROJECTED SYNCROLIFT MARGIN: [Line 3 - Line 6]	1,263	1,286	1,206	1,225	1,206	1,469	1,526	1,522	1,462	1,524
8. INCREMENTAL NET INCOME ATTRIBUTABLE TO NEW SYNCROLIFT: [Line 2 + Line 7]	4,988	5,116	4,656	4,755	4,656	6,829	7,826	7,747	6,767	7,789
9. CUMULATIVE INCREMENTAL NET WORTH:	4,988	10,104	14,760	19,515	24,171	31,020	38,846	46,593	53,360	61,149

COST/REVENUE ANALYSIS AND ASSUMPTIONS

TYPE OF FACILITY: SYNCROLIFT

($ Constant 1980)

INVESTMENT COST: $21.0 million

TYPE OF FINANCING & TERMS:

- Long-term debt
- Conventional Bond Issue @ 13.25% on 100% of project cost over ten (10) yrs.
  - -- Capital recovery factor on bond issue .186144

ANNUAL PAYMENTS:

Bond Issue

21.00 m
* .186144

$3,909,046

(3) Under Base Conditions, The Proposed Syncrolift Will Produce Over 20 Percent Return On Investment And 121 Percent Return On Equity

Under base conditions (i.e., municipal lease) defined in Exhibit III.3, ihe proposed Syncrolift will produce 21 percent return on investment in the first year of operation. Taking into account cost of capital at 18 percent, equity will be recovered within ten months.

SHIPLIFT SELECTION REVIEW

FOR

TODD SHIPYARDS

SAN PEDRO, CALIFORNIA

by

Shiptech lnternational, Inc.
2600 S. Gessner
Suite 504
Houston, Texas 770063

November 1980

APPENDIX B

SHIPLIFT REVIEW

INTRODUCTION

A review of this type between an established firm with numerous shiplift installations and a firm with an established reputation in other fields and an interest in entering the shiplift field must be viewed as an incumbent/challenger situation. Properly managed, this situation can benefit Toad as it inevitably will produce a lower price than would have been realized without competition. This review is based upon the presumption that Todd's prime objective in soliciting two proposals was to achieve a competitive price.

This report is presented in two phases. At this writing, Phase 1, the development of comparative design and operating features has been completed. At the reviewers request, pricing has been withheld to avoid influences on the data presented. Phase II will deal with pricing and is intended to be developed during a planned visit to San Pedro on November 12, 13, 1980.

The following format was used:

PHASE I

Design Features

Using Todd's RFP as a guide, a review of comparative design features between both proposals (including Shiplift and Transfer system) were developed. Where information was available in the technical proposal, it was used and ennumerated; where information was missing, it was derived or obtained by Shiptech directly from the proposers. Where one system offers features. not present in the other, a Shiptech comnent on the importance of that feature is provided.

Operating Features

A similar review of operational features was developed and is provided herein.

PHASE II

ost Features

A Comprehensive, "bottom line" cost comparison between the two systems will be developed with Todd's assistance.

Subjective Comments

A series of subjective comments on the differences between the systems, including Todd's risks, will be provided.

Recommendation

If specifically requested by Todd, a selection recommendation will be provided.

TODD SHIPL..T REVIEW

Design Features (Shiplift)

ITEM	TODD REQT	PEARLSON PROPOSED	SHIPTECH FOLLOW-UP	HYDRANAUTICS PROPOSED	SHIPTECH FOLLOW-UP	SHIPTECH COMMENT
Platform Length	650 ft	655 ft	---	650 ft	---	
Platform Width	---	106 ft	---	---	---	
Spacing of Lifters	---	13.5 ft	---	---	13.54 ft	
Platform Length - 1st to last beam	---	648 ft	---	636.3 ft	---	H. platform is 11.7 ft shorter than P.
Clear Width	107 ft	107 ft	---	107 ft	---	
Maximum Lifting Capacity	---	23,520 LT	---	23,481 LT	---	
Net Max. Capacity(No Cradle)	19,500 LT	19,650 LT	19,900 LT	19,500 LT	---	
Rated Capacity	---	13,100 LT	13,267 LT	13,000 LT	---	
Allowable Platform Load	30 LT/ft	30 LT/ft	---	30 LT/ft	---	
Allowable Deck Load	200 #/ft^2	---	200 #/ft^2	200 #/ft^2	---	
Concentrated	2000 #	---	2000 #	2000 #	---	
Vertical Lift	54 ft	54 ft	---	54 ft	---	
Capacity of lifters	---	240 LT	---	244.6 LT	---	
No. of Lifters	---	98	---	96	---	H "stretched" capacity to reduce quantity
Platform Weight	---	3621 LT	---	4000 LT	3952 LT	
Struct Steel	---	2950 LT	---	3240 LT	2900 LT	
Decking (wood)	---	440 LT	---	---	466 LT	
Rails	---	55 LT	---	66.2 LT	99.24 LT	
Sheaves and Housings	---	175 LT	---	---	125 LT	
Chair or Wire Rope	---	.5 LT one part	---	---	202 LT	
Fixed Structure for Transfer	---	None	---	---	160 LT(Est)	Assume 100 Blocks
Based on		Completed Design		Design Concept		

Operational Features (Shiplift)

ITEM	TODD REQT	PEARLSON PROPOSED	SHIPTECH FOLLOW-UP	HYDRANAUTICS PROPOSED	SHIPTECH FOLLOW-UP	SHIPTECH COMMENT
Vertical lifting speed	---	.75 ft/min	---	.3 ft/min		See Appendix
Lift time (One docking)	---	72 min	---	180 min		
Peak electrical demand (Spike)	---	1860 KVA	---	831 KVA		
Total power usage (One max. docking)	---	---	11.25 KWH	---	12.72 KWH	
Total power usage (Empty platform)	---	---	3.12 KWH	---	6.36 KWH	
Can plaform be adjusted in height during transfer?	---	---	Yes	---	No	Very important with large ships
Can platform sections be operated separately?	Option	---	Yes, no extra cost.	---	Add 1 pair jacks, extra cost	
Are beam load cells and central readouts included?	---	---	Yes	---	Extra cost, no common readout	Highly desirable
Can beams be selectively unloaded?	---	---	Yes	---	Limited ability	Desirable
Can platform be moved short distances to permit initial grounding control?	---	---	Yes	---	No	Very important
Does system have platform depth control readout?	---	---	Yes	---	Extra cost option	Highly desirable
Does system have upper and lower limit switches?	---	---	Yes	---		Highly desirable
Shiplift tested in service	Yes	About 150 lifts in service, largest about 20% of that proposed for Todd	---	1 operating chain jack lift about 10% of that proposed for Todd		
Identify features not tested in service	Yes	No untried features	---	No		

Design Features (Transfer System)

GENERAL	TODD REQT	PEARLSON PROPOSED	SHIPTECH FOLLOW-UP	HYDRANAUTICS PROPOSED	SHIPTECH FOLLOW-UP	SHIPTECH COMMENT
No of rails	6	4	---	6	---	Todd reportedly
Spacing from # 1	2.5'	3.5'	---	2.5'	---	concurs with
" " # 2	20.0'	23.5'	---	20.0'	---	Pearlson's approach
" " # 3	40.0'	N/A	---	40.0'	---	
Rail size	---	AREA 136 #	---	Beth 171 #	---	Possible problem
Wheel size	---	18.1"Ø	---	8.5"Ø	---	with rail levelness

Transfer Cradle (Longitudinal)

Maximum Shiplift Capacity (30x620)	18,600 LT	---	18,600 LT		---	
less cradle weight	---	---	463 LT	140 LT	---	
less cradle supports	---	---	N/A	---	160 T(Est)	
Transfer System Capacity	---	18,100 LT	---	16,884 LT	---	
Tons per foot	29.2LT/ft(Est)	29.2 LT/ft	---	27.2 LT/ft	---	
Keel line load (85%)	15,400LT(Est)	---	15,810 LT	12,180 LT	---	
Tons per foot	24.8LT/ft(Est)	---	25.5 LT/ft	19.65LT/ft	---	
Bilge line load (15%)	2715 LT(Est)	---	3000 LT	4704 LT	---	
Tons per foot	4.4 LT (Est)	---	4.5 LT/ft	7.65 LT/ft	---	
No. of wheels Keel	---	---	632	580	---	
Bilge	---	---	120	224	---	
Nominal wheel loading	---	---	24.07 LT	21 LT	---	
Wheel rated capacity	---	---	30 LT	---	21 LT	
Cradle length	620 ft	620 ft	---	620 ft	---	
Cradle width	90 ft	50 ft	---	---	90 ft	

TODD SHIP T REVIEW

Operational Feature (Transfer System)

GENERAL	TODD REQT	PEARLSON PROPOSED	SHIPTECH FOLLOW&UP	HYDRANAUTICS PROPOSED	SHIPTECN FOLLOW-UP	SHIPTECH COMMENT
Transfer system tested in Service?	Yes	Yes	---	No	---	
Did proposer identify features not tested in service?	Yes	None	---	No	---	
Transfer speed-shiplift to side transfer		19 min	---	---	N/A	II. indicatcs that
Transfer speed-side transfer yard	----	9 min	---	---	N/A	they will use sep-
Transfer speed-side transfer to berth	---	19 min	---	---	N/A	arate prime mover,
Total transfer time	----	47 min	---	---	N/A	not gripper jacks
Transfer function and stationary support separate or integral?	---	Integral	---	Separate	---	See cost section

TODD SHI T REVIEW

Transfer Cradle (Side Transfer)

GENERAL	TODD REQT	PEARLSON PROPOSED	SHIPTECH FOLLOW-UP	HYDRANAUTICS PROPOSED	SHIPTECH FOLLOW-UP	SHIPTECH COMMENT
Type	---	Pit	---	---	Pit	---
Length	530 ft	532 ft	---			
Width	90 ft	50 ft	---			
No. of rails	---	---	78	117		
Spacing of rails	---	---	84"	67.2"		
No. of wheels Keel	---	936	624	Modular system		
@ Bilge	---	936	312	to suit ship		
Nominal wheel load	---	---	30 LT			
Average wheel load	---	---	20.7			
Cradle weight	---	---	781 LT			
Prime mover	---	Tractor	---	GripperJack	Tractor	
Number of Shipcradles required	---	1 per berth	---	1 per berth	---	Basic difference
Sets of Bogeys	---	(integral)	---	(cyclable)	---	in concept
Static blocking sets	---	N/A		One per berth		

APPENDIX

1. Hydranautics Lift Speed Breakdown - (Per Hydranautics)

Sequence	Time
Engage upper pin	3.o sec
Disengage lower pin	3.0 sec
Lift stroke	111.4 sec
Engage lower pin	3.0 sec
Disengage upper pin	3.0 sec
Retract jack	19.9 sec
Total (One Stroke)	**143.3 sec**

54 ft lift x 2 part system ÷ 17" stroke @ 143.3 sec = 181.3 min

Unloaded platform travels at twice the above speed.

Comment

A full lift requires the manual activation of the system 76 times. It is our opinion that theoretical cycle times which use values such as 3 seconds are unrealistic. These are equipment response times. A realistic figure should be established which recognizes the human element.

2. Special Features

Certain special features are highly desirable for convenient and safe operation.

a) Platform Depth Indicator

Useful for dockmaster to verfiy platform depth for docking and undocking.

Syncrolift - Provided at no extra cost
Hydranautics -Extra cost option.

b) Load Cells with Display Readout

This is most important with large ships and has many functions. Among the most important are:

1. Determine preload for initial grounding to permit alignment and contact checks to be made prior to lift.

2. Monitor loads during transfer. Very important for irregularly loaded keel lines. This permits platform heights to be adjusted during transfer if necessary.

Syncrolift - Provided at no extra costs
Hydraunautics - Extra cost option.

c) Platform Height Changes During Transfer

It will sometimes be found necessary to adjust the platform elevation during transfer. This is necessary since platform beam deflections tend to decrease as vessel is transferred onto land. Load cell readout detects this effect and permits operator to adjust platform to avoid overload to transfer system or hull.

Syncrolift - Inherent capability
Hydranautics - Not available.

d) Initial Preload for Vessel Grounding

It should be possible to lift platform into initial contact with vessel at a controlled preload to enable dockmaster to check vessel position and contact prior to lift. This requires short controlled vertical travel.

Syncrolift - Inherent capability
Hydranautics - Would require stopping jack in mid-cycle. jack strokes can mismatch up to 1" in midstroke. This plus chain tolerance build-up make this a relatively inaccurate activity.

western union TELEX/TWX western union

TO: HYDRANAUTICS
GARY BARTMAN
TELEX: 658-445

FROM: SHIPTECH INTERNATIONAL
HOUSTON, TX
TELEX: 792397 (ANSWERBACK: MCCLURE HOU)

NOVEMBER 3, 1980

SUBJECT: TODD SHIPLIFT PROPOSAL

DURING MY REVIEW OF THE PROPOSALS A FEW QUESTIONS AND CLARIFICATIONS HAVE ARISEN; I'D APPRECIATE YOUR REVIEWING THE FOLLOWING AND RESPONDING BY TELEX IF PRACTICAL. I'M DUE OUT AT TODD ON THE 10TH OF NOVEMBER SO I'D LIKE WHATEVER YOU CAN GIVE ME BY FRIDAY. PLEASE CALL ME AT 713-789-5155 FOR ANY QUESTIONS.

SHIPLIFT

1. SHIPLIFT SPEED - PLEASE DETAIL ONE COMPLETE OPERATING CHAINJACK STROKE INDICATING:
   A) OPERATORS STEPS
   B) INDIVIDUAL AND TOTAL TIMES FOR OPERATIONS RESULTING IN ONE 17 INCH STROKE CYCLE
   C) TOTAL ELAPSED TIME FOR ONE 54 FOOT LIFT CYCLE.

2. HOW WAS INDIVIDUAL CHAIN JACK RATING INCREASED FROM 240 LT TO 244.6 LT (REV A VS B)?

3. GIVEN A HYDRAULIC CYLINDER DIAMETER OF 8.5 INCHES AND A PRESSURE OF 5000 PSI, HOW IS 120 TON LIFT CAPACITY ACHIEVED? (REV B)

4. AN ESTIMATE OF $600,000 IS PROVIDED FOR OWNER SUPPLIED SHEAVES.
   A) DOES THIS INCLUDE 192 SETS OF SHEAVE, HOUSINGS, SHAFT, BEARINGS AND SEALS?
   B) IS THIS A FIRM PRICE OR AN ESTIMATE?
   C) WHAT IS THE WEIGHT OF ONE COMPLETE SHEAVE SET WITH HOUSING, TWO SHEAVES, SHAFT, ETC?
   D) WHAT IS SHEAVE DIAMETER?
   E) ARE SHEAVES POCKETED?

5. PLEASE PROVIDE WEIGHT BREAKDOWN FOR PLATFORM. (STRUCTURAL STEEL, SHEAVE SETS WITH HOUSING, WOOD DECKING, TRANSFER RAIL, THAT PART OF CHAIN WHICH MUST BE LIFTED?.

6. WHAT IS SPACING OF LIFTERS?

7. WHY, WHEN, AND HOW IS EQUALIZER BAR HYDRAULIC CYLINDER USED?

8. ARE ALL ELEMENTS OF SHIPLIFT (SUCH AS CHAINJACK BASEPLATES, WIRE ROPE AND LATCH LINKAGES COVERED IN OWNER FURNISHED OR HYDRANAUTICS COS COST TESTIMATES) AND TARE THERE ANY OMISSIONS?

9. ARE THE FOLLOWING FEATURES PROVIDED:
   A) FPLATFORM DEPTH INDICATOR?
   B) INDIVIDUAL LOAD SENSORS WITH READOUT FOR INDIVIDUAL PLATFORM BEAMS?

10. POWER CONSUMPTION FOR:
   A) ONE FULL CAPACITY LIFT CYCLE IN KWH
   B) ONE EMPTY PLATFORM LIFT CYCLE

11. EXPLAIN BRIEFLY HOW THE FOLLOWING ARE ACCOMPLISHED:

   A) SPLIT PLATFORM AS REQUESTED IN RFP (OPTION)
   B) FRACTIONAL INCH VERTICAL ADJUSTMENTS IN PLATFORM EV ELEVATION DURING TRANSFER
   C) SELECTIVE UNLOADING OF INDIVIDUAL BEAM WHILE SHIP IS ON LIFT.
   D) INTIAL LIGHT VESSEL GROUNDING FOR ALIGNMENT CHECK PRIOR TO LIFTOUT .

TRANSFER SYSTEM

1. DOES SIDE TRANSFER CRADLE OPERATE IN A PIT OR DEPRESSED AREA RELATIVE TO THE BERTHING AREA?

2. WHAT IS RATED CAPACITY OF 8.5 WHEELS? PLEASE NOTE RATING AUTHORITY.

3. THE LIFTING CYLINDERS (402) UNITS) DO NOT SEEM TO BE ENNUMERATED IN THE BOGEY COST ESTIMATE. PLEASE ADVISE.

4. PLEASE NOTE TRANSFER SPEED ACHIEVED BY GRIPPER JACK. PROVIDE ESTIMATE OF TIME TO MAKE ONE LARGER VESSEL MOVE. START WITH COMPLETION OF SHIPLIFT CYCLE, END WITH WITHDRAWAL OF BOGEY TRAIN, INCLUDE SIZE TRADE TRANSPORT.

5. HOW DO BOGEWY BRACES CLEAR BLOCKING DURING TRANSFER?

6. VHAT IS WEIGGHT OF CONCRETE BLOCK? HOW MANY REQUIRED ON PLATFORM DURING SHIPLIFT CYCLE IF TRANSFER IS INVOLVED?

7. WHAT IS DISTRIBUTION OF WHEELS BETWEEN KEEL SUPPORT AND BILGE SUPPORT?

REGARDS,
SALZER
TELEX: 7932397/MCCLURE HOU

HYDRANAUTICS
PARTMAN

western union Telex/TWX

TO: GARY BARTMAN, HYDRANAUTICS
TELEX: 658445

FROM: J.R. SALZER - SHIPTECH
TELEX 792397

SUBJECT: TODD SHIPLIFT

GARY - A FEW FURTHER QUESTIONS

1. IGNORE SHIPLIFT QUESTION 3 ON PREVIOUS TELEX - MY ERROR.

2. YOUR BANDAR ABBAS PROPOSAL, PAGE 5-12, INDICATED THAT LIFT VA VALVES SETTINGS ARE ACCURATE WITHIN 2 PERCENT OF EACH OTHER AND THE DISPLACEMENT ERROR BETWEEN FASTEST AND SLOWEST JACK IS ABOUT 1 INCH. DOES THIS APPLY TO TODD?

3. WHAT IS DIMENSIONAL TOLERANCE ON CHAIN?

4. MY TRIP TO TODD MOVED OUT TO NOV. 13, 14.

REGARDS,

SALZER

western union Telex/TWX

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REGARDS,

SALZER

HYDRA GLTA

TODD SHIPLIFT REVIEW
PHASE II

I. SUMMARY

The following is a comparative summary of costs rather than an absolute since several common elements are not included (i.e., transfer pit construction, lift unit, civil works, decks, etc.).

		Syncrolift	Hydranautics
Shiplift		$12,552,100	$12,078,650
Transfer System	1 Berth	2,803,000	4,367,000
	2 Berths	3,877,000	4,657,000
	3 Berths	4,951,000	4,948,000
	4 Berths	6,025,000	5,238,000
	5. Berths	7,098,000	5,529,000
Annual Upkeep		Even	Even

III. TRANSFER SYSTEM CT COMPARISON

	Syncrolift	Hydranautics	(*)
Offerers base Price	---	S1,041,100	(1)
Additional Costs			
Side Transfer Pit Rails	(631LT)236,625	(1038LT) 685,081 @ 660	(2)
Side Transfer Cradle	1,510,350	1,583,230	(3)
Steel @ $1700	688.5K	423.3K	(4)
Wood @ $500	60.0	112.7	(5)
Rail	(@375) 13.0	(@660)65.3	(6)
Wheels	748.8	974.4	(7)
Drawings	Incl.	7.5	(8)
End Transfer Cradle (First Position)	1,056,000	1,057,500	(9)
Steel (@ $1700/LT)	348.5	175.1	(10)
Wood (@ $500/LT)\	17.5	---	(11)
Connectors (@ $1700/LT)	88.4	80.0	(12)
Wheels	601.6	---	(13)
Bogeys - Jacks	---	Incl.	(14)
Wheels	---	466.3	(15)
Hydraulics - Material	---	110.7	(16)
Inst.& Test	---	100.0	(17)
Plinths (One Set)	---	60.0	(18)
Drawings - 8 @ $1250	---	10.0	(19)
Rail at Berth	17.9	55.4	(20)

(*) - See Appendix

	Syncrolift	Hydranautics	(*)
End Transfer Cradle (extra positions)	S1,073,900	S290,500	(21)
620' length	1,056.0 ea.	175.1	(22)
Plinths	---	60.0	(23)
Rail (not installed)	17.9	55.4	(24)
524' length	897.800 (ea)	140.0	(25)
Plinths	---	50.0	(26)
Rail (not installed)	17.9	55.4	(27)

(*) - See Appendix

IV. ANNUAL UPKEEP - In order to realistically compare the average cost of major system upkeep, the following is presented:

	Syncrolift	Hydranautics
Lifting Medium	Wire Rope	Chain
Life Expectancy (Min)	5 years	15 years
(Probable)	7.5 years	23 years
Replacement Cost (1980)	$401,l8O(Set Of 98)	$959,583
Annualized Replacement (Min)	$80,360/yr;	S63,972
(Probable)	53,490/yr.	$41,721

It is assumed that preventative maintenance and upkeep are about equal. Repair is expected to be a bit higher with the various hydraulic systems. This would probably offset the savings due to the difference between annualized chain and wire rope replacement costs.

V. RECOMMENDATIONS

It is Shiptech's opinion that the selection of the SyncroLift ShiPlift and Transfer System will best serve Todd's objective. THe folLowing reasons are presented in support of this recommendation:

1. Prices, when developed on a comparative basis, are reasonably close, slighLy favoring Hyaranautics, especially if five work berths are considered.

2. Hydranautics has very limited experience. Their sole operating chain jack installation is approximately 10% of the size of the unit being offered to Todd. It is Shiptech's opinion that this experience cannot be confidently extrapolated by a factor of 10. Syncrolift's largest lift is about 90%"of the one proposed for Todd and the key factor, lift tons per foot, has been achieved in many installations.

3. Significant warrantee risks remain with Todd if the Hydranautics system is selected, including:

   a) Development of working drawings

   b) Hydraulic piping, fabrication, cleaning and installation

   c) Platform sheave housings

4. Numerous features are provided with the Syncrolift system, varying in importance from niceties to highly important features. These are either not available or available at extra cost from Hydranautics.

   a) Lift load cells - Very important

   b) Adjust height of platform during transfer - Very important

   c) Depth indicator - Nice

   d) Pre-load grounding feature - Very important

5. There are features in the Hydranautics proposal which have not had any significant operating history in large shiplifts (example)

   a) Two part chain system

   b) Equalizer bar

   c) Chain jack latch activator system

   d) Transfer system (in total)

RECOMMENDATION (CONTINUED)

6. The Hydranautics system is much slower than the Syncrolift system; less than half of the speed by Hydranautics own figures (which we believe may be optimistic).

7. The Hydranautics system does not provide the degree of control offered by Syncrolift.

   a) Syncrolift offers direct reading of status at each point at Control Station.

   b) Individual beams may be moved from Control Station.

8. Syncrolift proposal is based upon completed preliminary design. Hydranautics appears to be based upon concepts, some of which appear to be contradictory within the proposal.

J. R. Salzer, President
November 13, 1980

APPENDIX

BACKUP FOR SHIPLIFT COMPARISON

(1) Shiptech estimate of $1250 per drawing.

(2),(3) Lift unit quantity increased to 98 for both units. Hydranautics requires extra jacks to support Todd request for split platform (See nOteS on conversation with Bartman).

(4) Control wiring - $5,000 is Shiptech estimate.

(5),(6) Per Pearlson Proposal.

(7),(8) Hydranautics estimate extended to 98 sets, and 25% added for their procurement costs (per proposal).

(9) Material increased from $90 to $125 per Frank White.

(l0) Labor estimate by Todd (Frank White).

(11) Pearlson - 2950 Tons @ $1500
Hydranautics @ $1500

(12) Wood at $500

(13) 171# Rail @ $660,-136 @ $500

(14) Hydranautics - 98 units @ 2 Tons ea. x $1785 per Ton

(15) Assume 227 blocks @ $260 ea.

(16) Syncrolift estimate

(17) 30 days @ $275

(18) Shiptech estimate

BACKUP FOR TRANSFER SYSTEM COMPARISON

(1) Gripper jacks at $353,000 for 12 units removed from price.

(2) Rails only - No pit construction costs.

(3) Total of below listed items.

(4) Uses proposers weights x $1700/LT.

(5) Uses proposers weights x $500/LT.

(6),(7) Uses proposers price figures.

(8) 6 drawings at $1250 each.

BACKUP FOR TRANSFER SYSTEM COMPARISON (CONTINUED)

(9) Total for one operational cradle.

(l0) Uses proposers weights x $1700/LT.

(11) Uses proposers weights x $500/LT.

(12) Shiptech estimate.

(13) Uses proposers weights.

(14) , (15) May not include cart housings.

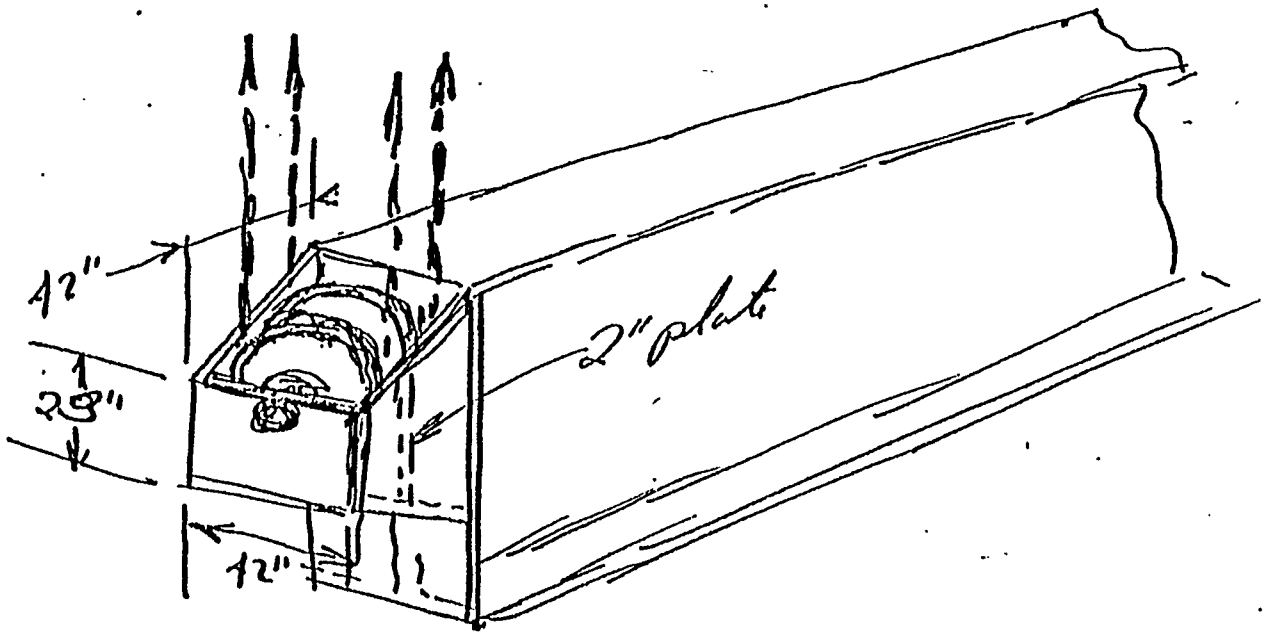
(16), (17) Estimate by Todd (F. White).

(18) 227 plinth at $265 each.

(19) 8 drawings at $1250 each.

(20) Uses proposers weights.

(21) - (27) Developed from above figures.



2) 23 x 42 @ 2" thk = 1089#

1) 36 x 42 @ 2" thk = 1705#

1 42 x 42 @ 2" thk. 994.7

3788 = wt 2 Tons @ $1780/ton = $3560/ea

HYDRANAUTICS PROPOSAL

PLATFORM SHEAVE ASSEMBLY (98 REQUIRED)

SHIPYARD FURNISHED (EXCL. SHEAVES)

F
TODD LA

WU INFOMASTER 1-019874C316 11/11/80
TLX WU MGR SNC
01 UG GOLETA CA
TWX 9103456788 TODD LA
ATTN: MR. LEN THORELL FOR DICK SALZER

TO: TODD - LOS ANGELES
ATTN: MR. LEN THORELL FOR DICK SALZER

QUESTIONS FROM SHIP TECH. INTL.
RE: TODD SHIPLIFT P-3838
TELEX DATED 11-3-80

1. SHIPLIFT SPEED

A) OPERATOR STEPS

STARTING POSITION: PLATFORM RESTING ON LOWER PINS, JACK FULLY RETRACTED.

1) ENGAGE UPPER PINS
2) DISENGAGE LOWER PINS
3) LIFT
4) ENGAGE LOWER PINS
5) DISENGAGE UPPER PINS
6) RETRACT

B) TIME SEQUENCE

1) 3.0 SECONDS (0.05 MIN)
2) 3.0 SECONDS (0.05 MIN)
3) 111.4 SECONDS (1.85 MIN)
4) 3.0 SECONDS (0.05 MIN.)
5) 3.0 SECONDS (0.05 MIN)
6) 19.9 SECONDS (0.33 MIN)

TOTAL 143.3 SEC. 2.39 MIN

AVERAGE SPEED 8.5/2.39 EQUALS 3.56 IN/MIN
EQUALS 0.297 FT/MIN

C) TOTAL ELAPSED TIME FOR 54 FOOT LIFT

EQUALS 54/.297 EQUALS 181.8 MIN
EQUALS APPROX. 3 HOURS

RAISING OR LOWERING AN EMPTY PLATFORM IS 1/2 THE TIME.

2. CHAIN JACK RATING

240 WAS NOMINAL RATING
BASED ON A FACTOR OF SAFETY OF 4:1 ON BREAK TEST OF THE CHAIN
(NOTE: THIS FS IS LARGER THAN REQUIRED BY LLOYDS REGISTRY OF SHIPPING). THE ALLOWABLE LOAD AT EACH JACK STATION (4 PARTS ORQ CHAIN BREAK TEST 2-1/8" CHAIN 546,000 LB) IS 546,000 X 4 PARTS EQUALS 244.6 L.T.

4 F.S. (2240)

3. JACK LIFT CAPACITY

THEORETICAL LIFT CAPACITY OF A JACK AT 5000 PSIG IS

8.5 (SQUARED) X .7854 X 5000 EQUALS 126.7 L.T.

4. CHAIN SHEAVE COST

A. PRICE INCLUDES EVERYTHING BUT HOUSING. HOUSING IS PART OF PLATFORM STRUCTURE.

B. ESTIMATE - BASED ON RECENT QUOTES FROM VENDOR.
C. EACH 1300 LBS. (APPROX.) SHEAVE, SHAFT AND BRACKETS
D. 30.47 IN. O.D.
E. YES. THE CHAIN LINKS ARE NOT SUBJECTED TO BENDING.

5. PLATFORM WEIGHT BREAKDOWN

STRUCTURAL STEEL (IN PROPOSAL)	2900 L.T.
WOOD DECK	466 L.T.
SHEAVES, BRGS, SHAFTS	128 L.T.
TRANSFER TRACKS (IN PROPOSAL)	99.24 L.T.
CHAIN (THAT MUST BE LIFTED)	202 L.T.

6. 13.54 FEET O.C.

7. LOAD EQUALIZERS PREVENT OVERLOAD AT EACH LIFT STATION. THEY ASSURE THAT THERE IS ALWAYS AN OIL CUSHION BETWEEN THE LOAD AND THE ''GROUND''. THEY ACCOMODATE '' POOR BLOCKING'' AND ALLOW INDIVIDUAL STATION ADJUSTMENT.

8. THE FLWG CUSTOMER COST ITEMS ARE NOT COVERED IN OUR PROPOSAL. (NOTE: WE MAY NOT WANT TO IDENTIFY TO CONSULTANT)

A. PLATFORM SHOP DRAWINGS.
B. PLATFORM FABRICATION.
C. PLATFORM ASSEMBLY AND INSTALLATION.
D. PILE CAP INTERFACE STRUCTURE.
E. PILE CAP INTERFACE INSTALLATION.
F. INSTALLATION OF HYDRAUAUTICS FURNISHED EQUIPMENT.
G. PIPING INSTALLATION (96 JACKS)
DOES NOT INCLUDE PIPE, TUBE AND FITTINGS.

9. ADDITIONAL FEATURES

A) AND B) THESE ITEMS ARE OPTIONAL FEATURES (WHICH CAN BE PROVIDED), NOT REQUIRED BY THE SPECIFICATION AND THEREFORE, NOT INCLUDED IN THE PRICE.

10. POWER CONSUMPTION

A) DURING FULL LOAD/LIFT, 3 EACH 300 HP POWER UNITS WILL OPERATE AT FULL LOAD 30 PERCENT OF THE TIME AND 30 PERCENT LOAD THE OTHER 70 PERCENT OF THE TIME.

B) DURING EMPTY PLATFORM LIFT POWER UNITS WILL OPERATE AT ABOUT AN AVERAGE OF 50 PERCENT OF THE ABOVE.

C) IT SHOULD BE NOTED THAT THE POWER UNITS ARE STARTED INDIVIDUALLY AT NO LOAD ON A Y-DELTA CIRCUIT. THUS MINIMIZING STARTING CURRENT.

11. A) AS DISCUSSED BETWEEN YOURSELF AND MR. BARTMAN, THE SPECIFIC REASONS AND OBJECTIVES IN A SPLIT PLATFORM NEED ADDITIONAL CLARIFICATION FROM THE CUSTOMER BEFORE WE CAN RESPOND TO THIS QUESTION.

B) WHEN THE SHIPLIFT PLATFORM IS IN THE FULL UP POSITION, THE MAIN LONGITUDINAL BEAMS ARE PINNED AT THE PROPER ELEVATION TO THE HEADWALL. THIS PROCEDURE MAINTAINS THE PROPER ELEVATION OF THE TRANSFER TRACKS REGARDLESS OF THE CHANGE IN LOAD AS THE SHIP IS MOVED OFF THE PLATFORM. ADDITIONALLY, HYDRAULIC OIL CAN BE ADDED TO OR TAKEN FROM THE LOAD EQUALIZER CYLINDERS IF FRACTIONAL INCH ADJUSTMENTS ARE REQUIRED.

NOTE: THAT PLATFORM IS BEING HELD ON THE CHAIN - LOCKED OFF ON THE FIXED PINS. INITIAL INSTALLATION PROVIDES FOR THIS CONDITION TO RESULT IN A LEVEL PLATFORM PRIOR W/THE YARD.

C) SELECTIVE UNLOADING OF INDIVIDUAL BEAMS CAN BE ACCOMPLISHED WITH THE LOAD EQUALIZER CYLINDERS.

D) PROCEDURE IS SAME AS YOU ANALYZED ON LUZON - PLEASE ELABORATE ON QUESTION.

QUESTIONS FROM TELEX 11/5/80

2. RECENT TESTS OF SKIDLIFT IN THE PHILIPPINES INDICATES THAT WE WILL BE ABLE TO HOLD WITHIN 1/2 INCH.

3. THE PROPOSED CHAINS ARE SIZED TO HYDRANAUTICS' SPECIFICATIONS DURING MANUFACTURE. REQUIRED TOLERANCES IS PLUS .09 INCHES MINUS 0 OVER ANY FIVE LINKS.

TRANSFER SYSTEM

1. YES. PER CUSTOMER REQUEST.

2. 21 LONG TONS AS SHOWN ON PAGE 5 OF PROPOSAL REV. B., WHEN USED ON TRACKS AS INDICATED ON PAGE 12. RATING IS IN AANCE WITH PROPOSED RATINGS TO THE CMAA AND THE MANUFACTURER (XTEX).

NOTE THAT WHEEL OVER LOADING IS PREVENTED BY HYDRAULIC SUPPORT SYSTEM.

3. CYLS ARE PROVIDED BY HYDRANAUTICS, 1ST ITEM UNDER HORIZONTAL TRANSFER SYSTEM, PAGE 8, REV. B.

4. GRIPPER JACK WILL BE USED FOR BREAKAWAY - CUSTOMER WILL USE TOWING PRIME MOVER.

5. THERE ARE NO BOGIE BRACES. BALANCE ANALYSIS SHOWS THAT THE BOGIE TRAIN IS STABLE ON THE 4-INCH WIDE TRACK WITHOUT BRACES.

6. WE WOULD RECOMMEND USE OF STANDING WAYS ON THE PLATFORM ALONG THE KEEL LINE AND SUPPORTS OF EACH OF THE OUTRIGGER POSITIONS FOR THE BILGES. REFER TO SKETCHES ON LAST FEW PAGES OF PROPOSAL REV. B. DISREGARD P. 40, REV. A.

7. THE BOGIE TRAINS ARE SEGMENTED. DISTRIBUTION WILL BE IN ACCORDANCE WITH THE SHIP WEIGHT DISTRIBUTION AND AT THE DISCRETION OF THE DECK MASTER.

REGARDS,

WADE BROCK HYDRANAUTICS TELEX 658445 11 NOV. 80

P.S. OUR TLX MACHINE IS TEMPORARILY OUT OF ORDER. BEING SENT FROM TLX MN NO. 658411.

2224 EST

TODD LA